



DET NORSKE VERITAS

CLIMATE ACTION RESERVE VERIFICATION REPORT

Report for:
TERRA INDUSTRIES, INC.
(TERRA MISSISSIPPI NITROGEN, INC.)
CAR 768

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Summary: Det Norske Veritas (U.S.A.), Inc. (DNV) has performed the verification of the GHG emission reductions achieved by the project, "Terra Yazoo City #9, Nitrous Oxide Abatement Project" for the period of 16 April, 2009 to 22 June, 2010. In DNV's opinion, the GHG emission reductions reported to the Climate Action Reserve (CAR) are fairly stated. The GHG emissions reductions were calculated correctly on the basis of the approved CAR "Nitric Acid Production Project Protocol Version 1.0: Reducing Nitrous Oxide from Process Gas Emissions" and the supporting documentation. DNV is able to verify that the emission reductions from the "Terra Yazoo City #9, Nitrous Oxide Abatement Project" during the period 16 April, 2009 to 22 June, 2010 equate to 169 863 tCO₂e.			
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ABBREVIATIONS

AOR	Ammonia Oxidation Reactor
AIFR	Ammonia to Air Ratio
CAR	Climate Action Reserve
CDM	Clean Development Mechanism
CEMS	Continuous Emissions Monitoring System
CH ₄	Methane
CI	Confidence Interval
COI	Conflict of Interest
CO ₂	Carbon Dioxide
CO ₂ e	Carbon Dioxide Equivalent
CRTs	Climate Reserve Tonnes
DNV	Det Norske Veritas
(EF _{BL})	Baseline Emission Factor
EN	European Norm
EU	European Union
GHG	Greenhouse Gas(es)
GWP	Global Warming Potential
HNO ₃	Nitric Acid
NH ₃	Ammonia
NAP	Nitric Acid Plant
NAPPP 1.0	Nitric Acid Production Project Protocol Version 1.0
N ₂ O	Nitrous Oxide
OH	Operating Hours
OP	Oxidation Pressure
OT	Oxidation Temperature
POCs	Permitted Operating Conditions
QA/QC	Quality Assurance & Quality Control
t	Metric Tonnes
UAN	Urea Ammonia Nitrate



1. INTRODUCTION

Det Norske Veritas (U.S.A.), Inc. (DNV) has been contracted by Terra Industries, Inc. (Terra) to verify the greenhouse gas (GHG) emission reductions generated by the Terra Yazoo City # 9, Nitrous Oxide Abatement Project (Yazoo Project) for the period 16 April, 2009 to 22 June, 2010. The verification was completed as required in the Climate Action Reserve (CAR) Verification Program Manual, 17 June, 2009. This report contains the findings from the verification and a statement for the verified GHG emission reductions.

1.1 *Verification Objective*

Verification is the process through which a verification body assesses a project developer's GHG reduction assertions against verification criteria and standards that are defined by the CAR GHG program. The purpose of verification is to provide an independent third-party review of project data and information being submitted to the CAR, to ensure that the project is eligible as defined in the relevant project reporting protocols and that the reported GHG emission reductions meet the appropriate five percent (5%) materiality threshold.

The CAR requires third-party verification of all GHG projects, as specified in each project protocol. Climate Reserve Tonnes (CRTs) are issued for voluntary emission reductions only after a Verification Report and a Verification Opinion attesting to their accuracy have been submitted by the verifier and accepted by the CAR.

The objective of this verification was to verify that the voluntary emission reductions (carbon dioxide equivalents (CO₂e)) reported for the Yazoo Project for the period 16 April, 2009 to 22 June, 2010 are real, verifiable, permanent and owned by Terra Mississippi Nitrogen, Inc.

1.2 *Verification Scope and Criteria*

The scope of the verification includes:

- Ensuring that the project is eligible according to the specific eligibility rules in the CAR's Nitric Acid Production Project Protocol Version 1.0 (NAPPP 1.0).¹
- Ensuring that the project boundary has been clearly defined and that the project emission sources in the baseline scenario and project activity have been identified and monitored as per the NAPPP 1.0.
 - Reviewing GHG management systems and estimation methodologies.
 - Verifying the emission estimates through a site visit, an in-depth review of source data and recalculation of a sample of GHG emission reduction



estimates to ensure that the reported GHG reductions are within the 5% materiality threshold and calculated in line with the CAR's NAPPP 1.0 protocol.

According to the CAR, the criteria to be applied during this verification include those contained in the following documents:

- CAR Nitric Acid Production Project Protocol Version 1.0: Reducing Nitrous Oxide from Process Gas Emissions;¹
- CAR Nitric Acid Production Project Protocol Errata and Clarifications;²
- Verification Program Manual;³
- ISO 14064-3:2006.⁴

1.3 Level of Assurance and Materiality Assessment

During the verification, DNV has focused on providing a reasonable level of assurance that:

- The GHG emission reduction calculation methodology used is appropriate and correctly applied.
- The GHG emission reductions have been monitored, calculated and reported within the 5% materiality criteria.

2. PROJECT INFORMATION

2.1 Project Background

The Yazoo Project is located in Yazoo, MS and is contained within Terra's Yazoo City nitrogen manufacturing facility. Terra's Yazoo City facility consists of one ammonia plant, four nitric acid plants, an ammonia nitrate plant, two urea plants, a urea ammonia nitrate plant and a dinitrogen tetroxide production facility.

The four nitric acid plants in the Yazoo City nitrogen manufacturing facility rely upon the catalytic oxidation of ammonia to produce nitric acid (HNO₃) as an intermediary product. Subsequently, the potent GHG nitrous oxide (N₂O) is directly released to the atmosphere as a waste by-product. The Yazoo Project is designed to reduce the release of N₂O during the HNO₃ production process in a nitric acid plant (NAP) through the installation of a secondary catalyst within the ammonia oxidization reactor (AOR) contained in the AOP # 9 Plant, one of the four NAPs located in the Yazoo City facility.

2.2 Project Activities

In 2008, Terra successfully installed a continuous emissions monitoring system (CEMS) to monitor N₂O concentration and flow of the flue gas of the AOP # 9 Plant.⁵ Subsequent to installation of the CEMS, Terra implemented and completed a baseline monitoring



campaign between 03 December, 2008 and 14 April, 2009. On 15 April, 2009, Terra installed a secondary catalyst system below the gauze section of the AOR of the AOP # 9 Plant.⁶ The following day, Terra began operating and monitoring the Yazoo Project for the first of three project campaigns during the verification period.

2.3 Project Ownership and Involved Parties

The Yazoo Project is operated by Terra Mississippi Nitrogen, Inc. which is a wholly owned subsidiary of Terra Industries, Inc. Ownership of the Yazoo Project and any emission reductions generated are retained by Terra Mississippi Nitrogen, Inc..⁷

For the development and registering of the Yazoo Project with the CAR, Terra has contracted with MGM Innova (MGM). MGM's involvement with the Project does not involve ownership of CRTs generated.

3. VERIFICATION ACTIVITIES

DNV has undertaken verification activities and compiled the verification team and tasks based on the complexity of the Terra's GHG emission reductions and the underlying data supporting them. The verification team and process are summarized below and in Table 1.

Verification Team	
David DeVooght	Lead Verifier/ Project Manager
Weidong Yang	Senior Internal Reviewer
Barbara Toole O'Neil	Technical Assistance
Miguel Rescalvo	Corporate Reviewer
Ali Mirzakhani	Corporate Reviewer



Table 1: Verification Activities

Task	Activities	Completion Data
1	Conflict of Interest form approved by CAR	29 July, 2010
2	Verification kick-off meeting	16 August, 2010
3	Desk review	16-23 August , 2010
4	Site visit	26 August, 2010
5	Senior internal review	25 October, 2010
6	Quality assurance review	28 October, 2010
7	Submission of verification report to Project Developer	29 October, 2010
8	Verification opinion uploaded to CAR project site	02 December, 2010

3.1 Desk Review

DNV assessed the documents provided by the project developer, including the project monitoring plan, GHG emission reductions spreadsheets, site design documentation and legal documents.^{8,9,10,11,12,13,14,15,16,17,18,19} Initial risk areas related to the GHG emission reduction estimates were identified through the document review. The on-site visit agenda was prepared according to items noted during the desk review. DNV then provided Terra a site visit agenda containing a preliminary sampling plan prior to the site visit.

3.2 Site Visit

On 26 August, 2010, DNV performed a site visit at Terra's Yazoo City nitrogen manufacturing facility in Yazoo City, MS. During the site visit, DNV reviewed records and interviewed staff members and was able to verify the project facility operation, including the monitoring practices related to the GHG emission reduction estimates. DNV conducted a walk through survey of the Yazoo City AOP # 9 Plant and was able to confirm that the actual implementation of the project conforms to the description contained in the project submittal form²⁰ and monitoring plan.⁸

During the site visit, DNV was also able to identify the risk areas in the project activity. A sampling plan was developed during the site visit and GHG emission reductions were checked from the data sampled on-site.

The site visit included opening and closing meetings. The attendees for each meeting and their respective organizations are shown in Table 2.



Table 2: Site Visit Attendees

Opening and Closing Meetings 26 August, 2010.	
Organization	Attendees
Terra	Jim Schellhorn
MGM	Deryl Beaird
	Walter Hugler
	Fleming Ray
	Julian Castellanos
DNV	David DeVooght

4. VERIFICATION FINDINGS

4.1 Summary

DNV was able to verify that the GHG emission reductions reported for the Yazoo Project are fairly stated.

Some clarification requests were identified during the verification. Responses were provided by Terra to the satisfaction of DNV.

4.2 Project Definition

Chapter 2.2 of the NAPPP 1.0 defines a GHG reduction project as the installation of a N₂O abatement technology at a single NAP that results in the reduction of N₂O emissions that otherwise would have been vented to the atmosphere. Additionally, Chapter 2.2 of the NAPPP 1.0 establishes four criteria for the disqualification of projects that operate N₂O abatement projects. DNV verified that these four criteria do not apply to the Verdigris Project and therefore, the project meets the project definition defined in the NAPPP 1,0 for the period of 16 April, 2009 to 22 June, 2010.

4.3 Project Eligibility

Chapter 3 of the NAPPP 1.0 establishes that a project must satisfy four eligibility rules to meet the definition of a GHG emission reduction project. DNV verified that the Yazoo Project is in conformance with these four eligibility requirements for the reporting period of 16 April, 2009 to 22 June, 2010.

4.3.1 Eligibility Rule I – Project Location

On 26 August, 2010, a qualified DNV lead verifier conducted a site visit at the Terra Yazoo nitrogen manufacturing plant in Yazoo City, MS. DNV verified that the Yazoo Project is located in the AOP # 9 Plant of the Terra Yazoo nitrogen manufacturing plant.



4.3.2 Eligibility Rule II – Project Operation Start Date

DNV verified the Yazoo Project's conformance with this eligibility rule by confirming installation of the secondary catalyst on 15 April, 2009 and confirming that the project was submitted to the CAR on 04 June, 2010.^{20,21}

The submittal of the Yazoo Project on 04 June, 2010 complies with the CAR requirement that projects operating before the adoption of the NAPPP 1.0 submit within 12 months of the effective date (02 December, 2009). Installation of the secondary catalyst on 15 April, 2009 demonstrates that the project began operations within the 24 months before the effective date of the NAPPP 1.0 (02 December, 2007).

4.3.3 Eligibility Rule III – Project Additionality

The Performance Standard Test

DNV confirmed that on 15 April, 2009, Terra installed a secondary N₂O abatement catalyst within the AOR of the AOP # 9 Plant in the Terra Yazoo City nitrogen manufacturing plant. Installation of the secondary catalyst within the AOR demonstrates compliance with the performance standard and the project definition defined in Section 2.2.1 of the NAPPP 1.0.

The Legal Requirement Test

DNV confirmed that Terra submitted to the CAR a signed Attestation of Voluntary Implementation, which demonstrates the initial conformance with the Legal Requirement Test.²² DNV also verified the Yazoo Project's conformance with this eligibility rule by confirming the procedures developed by Terra to ensure compliance with the Legal Requirement Test are implemented as described in the Monitoring Plan. Furthermore, DNV reviewed environmental permits and confirmed that Terra's Yazoo City nitrogen manufacturing facility is not subject to regulations requiring the installation of a secondary catalyst within the Plant # AOR to abate N₂O emissions.

4.3.4 Eligibility Rule IV – Regulatory Compliance

DNV has verified that Yazoo Project conforms to the Regulatory Compliance rule. This conclusion is based on Terra's submission of a signed Attestation of Voluntary Implementation and a signed Attestation of Regulatory Compliance to the CAR.^{22,23} Additionally, during the site visit DNV reviewed Terra's operating permits relevant to the project and confirmed that the Yazoo City nitrogen manufacturing facility met all applicable state and local regulations.^{24,25,26,27,28,29} There were no-periods of non-compliance identified during the baseline and campaign periods. DNV also confirmed with Terra that monitoring mechanisms are instituted within the plant managing continued compliance.²⁶



4.4 Monitoring Plan

4.4.1 Monitoring Plan

The Yazoo Project monitoring plan is in accordance with the NAPPP 1.0 and allows for the accurate measurements of actual GHG emissions reductions.

Monitoring Data

All of the necessary data needed to estimate GHG emission reductions are included in the monitoring plan.

For the Historical Operating Period (11 March, 2006 – 09 June, 2008), the Yazoo Project monitored the following permitted operating conditions (POCs):

- Oxidation temperature (OT) of NAP
- Oxidation pressure (OP) of NAP
- Ammonia-to-air (AIFR) ratio

The NAPPP 1.0 requires that when determining POCs, a project must employ “*the best available historical data for the operating range of temperature and pressure, and maximum ammonia-to-air ratio from the previous five campaigns*”. Due to an equipment malfunction within the AOR of the AOP # 9 Plant in December, 2007 an abnormally short campaign (89 days) resulted. Terra removed data generated from this campaign from the Historical Operating Period POC determinations. Therefore, for the Yazoo Project, the POC determinations are based upon data from five of the six consecutive campaigns prior to the project start date. During the site visit, DNV verified the equipment malfunction of the abnormally short campaign. It is DNV’s opinion that removal of data from this campaign resulted in the use of the best available historical data for the determination of POCs.

Additionally, GHG emission sources, HNO_3 production and operating parameters were measured for a baseline campaign period and three project campaign periods. The details of these measurements are shown in Tables 3, 4 and 5.



Table 3: Periods of Project Monitoring and HNO₃ Production

Project Period	Dates	HNO₃ Production (tonnes)
Historical Operating Period	11 March, 2006 – 09 June, 2008	N/A
Baseline Campaign	03 December, 2008 – 14 April, 2009	80 266
Project Campaign 1	16 April, 2009 – 03 September, 2009	79 896
Project Campaign 2	04 September, 2009 – 02 February, 2010	89 113
Project Campaign 3	03 February, 2010 – 22 June, 2010	81 839



Table 4: Monitored Parameters Determined From Historical Campaigns

Parameter	Value		DNV Verification Activities
OT _{Normal}	Maximum	926 °C	1. Reviewed historical data.³⁰ 2. Confirmed the historical data was adjusted in accordance with the requirements of Section 5.1.1.1 of the NAPPP 1.0. 3. Confirmed range of historical oxidation temperature is within the permitted range of NAP operating manual.³¹ 4. Confirmed on-site the location of thermocouple within the AOR. 5. Discussed and reviewed quality assurance practices related to proper function and calibration procedures.³²
	Minimum	760 °C	
OP _{Normal}	Maximum	7.0 Bar	1. Reviewed historical data.³⁰ 2. Confirmed the historical data was adjusted in accordance with the requirements of Section 5.1.1.1 of the NAPPP 1.0. 3. Confirmed range of historical oxidation pressure is within the permitted range of the NAP operating manual.³¹
	Minimum	6.0 Bar	
AIFR	Maximum	11%	1. Reviewed historical data.³⁰ 2. Confirmed the maximum historical operating NH₃ to air value is within the permitted range of the NAP operating manual.³¹

For the baseline campaign and project campaign periods, DNV confirms that the monitoring mechanisms and the monitoring frequency of project parameters are in accordance with the requirements of the NAPPP 1.0.

Table 5: Monitored Parameters for Baseline Campaign and Project Campaigns

Parameter	Metering Device	Calibration and QA/QC Procedures
HNO ₃	Micro – motion flow meter	1. Checked for proper operation each gauze change.³³ 2. Successfully calibrated 27 April, 2010.³⁴
OH	Fisher Provox DCS	1. N/A – Plant operating system does not require calibration.
OT	Thermocouple - Moore Industries TCT/R510MVFS	1. Replaced each gauze change.
OP	Converter Pressure Transmitter – Yokogawa EJA 430-AWAS4B-92NB/FF1/01	1. Correct functioning of instrument is continuously monitored and verified during plant operation.³³
AIFR	Orifice plate meters– Air Flow Transmitter – Rosemont NH₃ Flow Transmitter – Rosemount	1. Orifice plate meters are employed for measuring both air flow and NH₃. The orifice plate meter does not require calibration. 2. Adjusting transmitters during operation of the plant is not feasible. Therefore, calibration work is not completed at set intervals. If it is determined that the transmitters are malfunctioning, they are adjusted during a plant shutdown and adjustments are recorded in a maintenance log. 3. For the baseline campaign and project campaigns, the transmitters for the air and NH₃ meters operated correctly and did not require calibration.
NC _{SG BC}	Gas Analyzer – ABB 2000-Uras26	1. Qal 1 performance test certifying the product's conformance with the requirements of the European Union (EU) directives 2001/80/EC and 2000/76/EC.³⁵ 2. Qal 1 test to certify conformance of system with EU directive 2003/87/EC.³⁶ 3. Qal 2 test to certify conformance with European standard EN 14181.³⁷ 4. Weekly Qal 3 test including zero and span check for N₂O concentration.³⁸
NC _{SG}		
V _{SG}		
V _{SG BC}		

CEMS Installation and Quality Assurance and Control (QA/QC)

In 2008 and prior to the adoption of the NAPPP 1.0, the Yazoo Project installed and began operating an ABB Gas Analyzer AO2000 Series CEMS. At the time of installation, the QA/QC requirements and installation requirements for N₂O abatement projects within NAPs had not been established by the CAR. Therefore, the Yazoo



For Terra Industries, Inc.

Project installed and operated the CEMS in accordance with European Norm (EN) 14181 requirements, which were the generally accepted industry practice for monitoring Clean Development Mechanism (CDM) N₂O abatement projects.

Chapter 6 of the NAPPP 1.0 requires CEMS monitoring N₂O concentration and flow in the flue gas to operate QA/QC provisions and activities in accordance with the United States Code of Federal Regulations Title 40 (40 CFR), Part 60 and Part 75. On 28 May, 2010, Terra filed a Request for Project Variance³⁹ petitioning the CAR to allow the Yazoo Project to substitute EN 14181 CEMS QA/QC provisions and activities for these requirements. The CAR responded on 14 September, 2010 with a Variance Approval.⁴⁰

The Variance Approval states that the Yazoo Project must meet the following condition:

“Terra Industries may use the system installation and certification and QA/QC provisions as written in the European Norm EN14181 and outlined in the variance and supplemental information, provided that the verifier can confirm that a sound installation, monitoring and QA/QC process was followed and was in conformance with the requirements of EN14181.”

In accordance with the Variance Approval, DNV reviewed installation records and QA/QC records and also conducted interviews to determine if the CEMS was installed, monitored and maintained in accordance with EN 14181.^{35,36,37,38} Based upon this review, DNV can verify that for the period of 03 December, 2008 to 22 June, 2010 the CEMS installed to monitor N₂O at the Yazoo Project followed a sound installation, monitoring and QA/QC process in accordance with the requirements of EN 14181.

QA/QC for non-CEMS Related Equipment

All of the QA/QC procedures to ensure the correct measurement, calculation and reporting of emissions reductions are properly defined for each parameter and have been clearly documented in the Monitoring Plan. These include:

- Organization and responsibility.
- Data management and record keeping.
- Operations and maintenance.
- Regulatory compliance and violation.

4.4.2 Implementation of Monitoring Plan

After reviewing the relevant records, interviewing staff members and observing practices on-site, DNV verified that the monitoring plan was effectively implemented during this verification period.



4.4.3 The GHG Assessment Boundary

The GHG assessment boundary for the Yazoo Project is limited to N₂O released as a reaction by-product. DNV confirms N₂O released as a by-product in the baseline campaign and the project campaigns has been accurately accounted for in the monitoring plan and emission reduction files.^{8,41,42,43, 44}

4.4.4 GHG Emission Reduction Calculations

Emission Reduction Calculation Equation

Equation 5.1 of the NAPPP 1.0 is properly applied for the GHG emission reduction calculations of the Yazoo Project, as shown in the Table 6 below.^{41,42,43, 44}

Table 6: Application of Equation 5.1 with Properly Selected Parameters

Parameter	Project Campaign			Unit
	1	2	3	
ER	53 003	64 090	52 770	t CO ₂ e
EF _{BL}	0.00643	0.00643	0.00643	t N ₂ O/t HNO ₃
EF _P	0.00429	0.00411	0.00435	t N ₂ O/t HNO ₃
HNO ₃ ER	79 896	89 113	81 839	t HNO ₃
GWP _{N₂O}	310	310	310	t CO ₂ e/tN ₂ O

Baseline Equations

Equations 5.2 and 5.3 of the NAPPP 1.0 are properly applied for the GHG emission reduction calculations of the Yazoo Project, as shown in the Tables 7 and 8 below.^{41,42,43,44}

Table 7: Application of Equation 5.2 with Properly Selected Parameter Values

Parameter	Value (metric tonnes (t))	Unit (metric tonnes (t))
EF _{BL}	0.00643	t N ₂ O/t HNO ₃
BE _{BC}	508.15	t N ₂ O
HNO ₃ BC	78 959	t HNO ₃

Table 8: Application of Equation 5.3 with Properly Selected Parameter Values

Parameter	Value	Unit
BE _{BC}	508.15	t N ₂ O
V _{SG BC}	79 972	m ³ /hour
NC _{SG BC}	2 080	mgN ₂ O/ m ³
OH _{BC}	3 055	hours



Campaign Equations

Equations 5.4 and 5.5 of the NAPPP 1.0 are properly applied for the GHG emission reduction calculations of the Yazoo Project, as shown in Tables 9 and 10 below.^{41,42,43}

Table 9: Application of Equation 5.4 with Properly Selected Parameter Values

Parameter	Project Campaign			Unit
	1	2	3	
PE _n	342.83	366.47	355.68	t N ₂ O
V _{SGn}	78 661	80 685	80 317	m ³ /hour
NC _{SGn}	1 296	1 270	1 333	mgN ₂ O/ m ³
OH _n	3 362	3 576	3 323	hours

Table 10: Application of Equation 5.5 with Properly Selected Parameter Values

Parameter	Project Campaign			Unit
	1	2	3	
EF _n	0.00429	0.00411	0.00435	t N ₂ O/t HNO ₃
PE _n	342.83	366.47	355.68	t N ₂ O
HNO _{3n}	79 896	89 113	81 839	t HNO ₃

4.4.5 Other Calculations

Campaign Length Cap

In accordance with Section 5.1.1.3 of the NAPPP 1.0, Terra calculated a campaign length cap (CL_{cap}) for t HNO₃ produced. For the Yazoo Project, the CL_{cap} equated to 79 529 t HNO₃.

The NAPPP 1.0 requires the elimination of N₂O values and HNO₃ production measured beyond the CL_{cap}. Terra's baseline campaign produced 80 266 t HNO₃, which is greater than the CL_{cap}. Therefore, in accordance with the NAPPP 1.0, when calculating the baseline emission factor (EF_{BL}), Terra eliminated N₂O values and HNO₃ production values measured beyond the CL_{cap} (79 529 t HNO₃). DNV reviewed the baseline campaign calculations and determined that the CL_{cap} was properly applied for the determination of the EF_{BL}.^{11,44}



HNO₃MAX and HNO₃MAXSCALED

The calculation of HNO₃MAX and HNO₃MAXSCALED for the Yazoo Project properly applied the requirements of the Nitric Acid Production Project Protocol Errata and Clarifications, specifically Clarification 1.^{41,42,43} DNV verified that HNO₃MAX was calculated from historical maximum annual average total output of 100% concentration nitric acid five years prior to the start of the project (16 April, 2004 and 15 April, 2009). HNO₃max for the Yazoo Project is 25 t HNO₃ for each hour of production.

The results of the HNO₃MAXSCALED calculations for the Yazoo Project are shown in Table 11.

Table 11: HNO₃MAXSCALED Values for Project Emissions

Parameter	Project Campaign			Unit
	1	2	3	
HNO ₃ MAXSCALED	84 004	89 113	83 075	t HNO ₃

Statistical Comparison of POCs

In accordance with Section 5.1.2.1 of the NAPPP 1.0 and the Nitric Acid Production Project Protocol Errata and Clarifications, specifically Clarification 4 Terra conducted a statistical comparison of the average historical mean POCs with the mean values developed from the baseline campaign and project campaigns for the following operating parameters:

- OT
- OP
- AIFR

DNV reviewed the statistical comparison and confirmed that the mean values for operating parameters for the baseline campaign and project campaigns fall within the upper and lower bound of the 95% confidence interval (CI) for POCs that were developed from the Historical Operating Period data.^{30, 41,42,43,44}

Table 12 lists the descriptive statistics for POCs in the historical period.



Table 12: Descriptive Statistics for Historical Operating Period POCs

POCs	Statistical Parameters			
	Mean	Standard Deviation	95% CI Upper Bound	95% CI Lower Bound
T (°C)	870	112	1 090	650
P (Bar)	6.6	0.9	8.4	4.8
AIFR (%)	10.4	1.4	13.1	7.7

Table 13 lists operating parameter means for the baseline campaign and project campaigns. DNV confirms all values listed fall within the upper and lower bound of the 95% confidence interval for the mean POCs developed from the Historical Operating Period.

Table 13: Mean Values of Operating Parameters

Operating Parameter	Baseline Campaign	Project Campaigns		
		1	2	3
T (°C)	909	921	912	920
P (Bar)	7.0	7.0	7.0	7.0
AIFR (%)	10.3	10.6	10.4	10.5

4.5 Data Collection, Aggregation and Calculation

The data collection, aggregation and GHG emission reduction calculations have been planned properly and implemented effectively, as detailed below.

CEMS and Operating Conditions Data

N₂O concentration in the flue gas, flue gas flow rate, operating conditions and HNO₃ production data are continuously monitored and logged within the Yazoo City nitrogen plant management system. Data is pulled from this system and forwarded to an MGM representative, who incorporates the data into the Yazoo Project emission reduction calculation spreadsheet.

GHG Emission Reductions for the Period of 16 April, 2009 to 22 June, 2010

- The emissions reductions were calculated based on Equations 5.1., 5.2., 5.3, 5.4 and 5.5.
- The calculations were checked by a complete review of the baseline campaign and project campaigns emission reduction files. The calculations were determined to be accurate in accordance with the NAPPP 1.0 requirements. Additionally, DNV conducted a review of a one-month sampling period (October, 2009) and found no material or immaterial errors.



- The verified GHG emission reductions are shown in Table 14.

Table 14: GHG Emission Reductions for the Period of 16 April, 2009 – 22 June, 2010

Emission Parameters	Project Campaign		
	1	2	3
Baseline emissions (tCO ₂ e)	159 257	177 629	163 130
Project emissions (tCO ₂ e)	106 254	113 539	110 360
Emission reductions (tCO ₂ e)	53 003	64 090	52 770

Table 15: GHG Emission Reductions for the Period of 16 April, 2009 – 22 June, 2010 by Vintage Year

Vintage Year	Emission Reductions (t CO ₂ e)
2009	103 540
2010	66 323
Total	169 863



5. VERIFICATION OPINION STATEMENT

Det Norske Veritas (U.S.A.), Inc (DNV) has performed a verification of GHG emission reductions reported for the “Terra Yazoo City # 9, Nitrous Oxide Abatement Project” managed by Terra Mississippi Nitrogen, Inc. for the period of 16 April, 2009 to 22 June, 2010.

In DNV’s opinion, the GHG emission reductions reported for the project are fairly stated and the project meets all the verification criteria of the Climate Action Reserve.

The GHG emission reductions were calculated correctly, using methods and data contained in the Nitric Acid Production Project Protocol: Reducing Nitrous Oxide from Process Gas Emissions, Version 1.0, and the monitoring plan provided.

DNV was able to verify that the emission reductions from the “Terra Yazoo City # 9 Nitrous Oxide Abatement Project” managed by Terra Mississippi Nitrogen, Inc. for the period from 16 April, 2009 to 22 June, 2010 amount to 169 863 tCO₂e.

Prepared By:

A handwritten signature in cursive script, reading 'David DeVooght'.

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Senior Internal Review By:

A handwritten signature in cursive script, reading 'Weidong Yang'.

Weidong Yang
CAR Lead Verifier, Det Norske Veritas (U.S.A.), Inc.



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