

# **STATE OF MISSISSIPPI AIR POLLUTION CONTROL PERMIT**

**TO CONSTRUCT AIR EMISSIONS EQUIPMENT**

**THIS CERTIFIES THAT**

Terra Mississippi Nitrogen Inc  
4612 Highway 49 East  
Yazoo City, Mississippi  
Yazoo County

## **2012 Ammonia Plant Turnaround Projects**

has been granted permission to construct air emissions equipment to comply with the emission limitations, monitoring requirements and other conditions set forth herein. This permit is issued in accordance with the provisions of the Mississippi Air and Water Pollution Control Law (Section 49-17-1 et. seq., Mississippi Code of 1972), and the regulations and standards adopted and promulgated thereunder.

**MISSISSIPPI ENVIRONMENTAL QUALITY PERMIT BOARD**

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**AUTHORIZED SIGNATURE**

**MISSISSIPPI DEPARTMENT OF ENVIRONMENTAL QUALITY**

**Issued: September 27, 2012**

**Permit No.: 3020-00010**

**Modified:**

**Part I.**

**A. GENERAL CONDITIONS**

1. This permit is for air pollution control purposes only. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.1.D.)
2. Any activities not identified in the application are not authorized by this permit. (Ref.: Miss. Code Ann. 49-17-29 1.b)
3. The knowing submittal of a permit application with false information may serve as the basis for the Permit Board to void the permit issued pursuant thereto or subject the applicant to penalties for operating without a valid permit pursuant to State Law. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.2.B(5).)
4. It is the responsibility of the applicant/permittee to obtain all other approvals, permits, clearances, easements, agreements, etc., which may be required including, but not limited to, all required local government zoning approvals or permits. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.1.D(6).)
5. The issuance of a permit does not release the permittee from liability for constructing or operating air emissions equipment in violation of any applicable statute, rule, or regulation of state or federal environmental authorities. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.2.B(7).)
6. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of the permit, unless halting or reducing activity would create an imminent and substantial endangerment threatening the public health and safety of the lives and property of the people of this state. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.2.B(15)(a).)
7. The permit and/or any part thereof may be modified, revoked, reopened, and reissued, or terminated for cause. Sufficient cause for a permit to be reopened shall exist when an air emissions stationary source becomes subject to Title V. The filing of a request by the permittee for a permit modification, revocation and reissuance, or termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.2.B(15)(b).)
8. The permit does not convey any property rights of any sort, or any exclusive privilege. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.2.B(15)(c).)
9. The permittee shall furnish to the DEQ within a reasonable time any information the DEQ may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. Upon request, the permittee shall also furnish to the DEQ copies of records required to be kept by the permit or, for information claimed to be confidential, the

permittee shall furnish such records to the DEQ along with a claim of confidentiality. The permittee may furnish such records directly to the Administrator along with a claim of confidentiality. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.2.B(15)(d).)

10. Design and Construction Requirements: The stationary source shall be designed and constructed so as to operate without causing a violation of an Applicable Rules and Regulations, without interfering with the attainment and maintenance of State and National Ambient Air Quality Standards, and such that the emission of air toxics does not result in an ambient concentration sufficient to adversely affect human health and well-being or unreasonably and adversely affect plant or animal life beyond the stationary source boundaries. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.A.)
11. Solids Removal: The necessary facilities shall be constructed so that solids removed in the course of control of air emissions may be disposed of in a manner such as to prevent the solids from becoming windborne and to prevent the materials from entering State waters without the proper environmental permits. (Ref.: Miss. Code Ann. 49-17-29)
12. Diversion and Bypass of Air Pollution Controls: The air pollution control facilities shall be constructed such that diversion from or bypass of collection and control facilities is not needed except as provided for in 11 Miss. Admin. Code Pt. 2, R. 1.10., "Air Emission Regulations for the Prevention, Abatement, and Control of Air Contaminants", Section 10. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 1.10.)
13. Fugitive Dust Emissions from Construction Activities: The construction of the stationary source shall be performed in such a manner so as to reduce fugitive dust emissions from construction activities to a minimum. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.A(4).)
14. Right of Entry: The permittee shall allow the Mississippi Department of Environmental Quality Office of Pollution Control and the Mississippi Environmental Quality Permit Board and/or their representatives upon presentation of credentials:
  - a) To enter upon the permittee's premises where an air emission source is located or in which any records are required to be kept under the terms and conditions of this permit; and
  - b) At reasonable times to have access to and copy any records required to be kept under the terms and conditions of this permit; to inspect any monitoring equipment or monitoring method required in this permit; and to sample any air emissions. (Ref.: Miss. Code Ann. 49-17-21)
15. Permit Modification or Revocation: After notice and opportunity for a hearing, the Permit Board may modify the permit or revoke it in whole or in part for good cause shown including, but not limited to:

- a) Persistent violation of any of the terms or conditions of this permit;
- b) Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts; or
- c) A change in federal, state, or local laws or regulations that require either a temporary or permanent reduction or elimination of previously authorized air emission.

(Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.2.C.)

16. Public Record and Confidential Information: Except for data determined to be confidential under the Mississippi Air & Water Pollution Control Law, all reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Mississippi Department of Environmental Quality, Office of Pollution Control. (Ref.: Miss. Code Ann. 49-17-39)
17. Permit Transfer: This permit shall not be transferred except upon approval of the Permit Board. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.16.B)
18. Severability: The provisions of this permit are severable. If any provision of the permit, or the application of any provision of the permit to any circumstances, is challenged or held invalid, the validity of the remaining permit provisions and/or portions thereof or their application to other persons or sets of circumstances, shall not be affected thereby. (Ref. 11 Miss. Admin. Code Pt. 2, R. 2.1.D(7).)
19. Permit Expiration: The permit to construct will expire if construction does not begin within eighteen (18) months from the date of issuance or if construction is suspended for eighteen (18) months or more. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.C(1).)
20. Certification of Construction: A new stationary source issued a Permit to Construct cannot begin operation until certification of construction by the permittee. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.D(3).)
21. Beginning Operation: Except as prohibited in Part I, Condition 24 of this permit, after certification of construction by the permittee, the Permit to Construct shall be deemed to satisfy the requirement for a permit to operate until the date the application for issuance or modification of the Title V Permit or the application for issuance or modification of the State Permit to Operate, whichever is applicable, is due. This provision is not applicable to a source excluded from the requirement for a permit to operate as provided by 11 Miss. Admin. Code Pt. 2, R. 2.13.G. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.D(4).)
22. Application for a Permit to Operate: Except as otherwise specified in Part I, Condition 24 of this permit, the application for issuance or modification of the State Permit to Operate or the Title V Permit, whichever is applicable, is due twelve (12)

months after beginning operation or such earlier date or time as specified in the Permit to Construct. The Permit Board may specify an earlier date or time for submittal of the application. Beginning operation will be assumed to occur upon certification of construction, unless the permittee specifies differently in writing. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.D(5).)

23. Operating Under a Permit to Construct: Except as otherwise specified in Part I, Condition 24 of this permit, upon submittal of a timely and complete application for issuance or modification of a State Permit to Operate or a Title V Permit, whichever is applicable, the applicant may continue to operate under the terms and conditions of the Permit to Construct and in compliance with the submitted application until the Permit Board issues, modifies, or denies the Permit to Operate. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.D(6).)

24. Application Requirements for a Permit to Operate for Moderate Modifications: For moderate modifications that require contemporaneous enforceable emissions reductions from more than one emission point in order to “net” out of PSD/NSR, the applicable Title V Permit to Operate or State Permit to Operate must be modified prior to beginning operation of the modified facilities. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.D(7).)

25. Compliance Testing: Regarding compliance testing:

- a) The results of any emissions sampling and analysis shall be expressed both in units consistent with the standards set forth in any Applicable Rules and Regulations or this permit and in units of mass per time.
- b) Compliance testing will be performed at the expense of the permittee.
- c) Each emission sampling and analysis report shall include but not be limited to the following:
  - (1) detailed description of testing procedures;
  - (2) sample calculation(s);
  - (3) results; and
  - (4) comparison of results to all Applicable Rules and Regulations and to emission limitations in the permit.

(Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.6.B(3), (4), and (6).)

**B. GENERAL NOTIFICATION REQUIREMENTS**

1. Within fifteen (15) days of beginning actual construction, the permittee must notify DEQ in writing that construction has begun. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.C(2).)
2. The permittee must notify DEQ in writing when construction does not begin within eighteen (18) months of issuance or if construction is suspended for eighteen (18) months or more. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.C(3).)
3. Upon the completion of construction or installation of an approved stationary source or modification, the applicant shall notify the Permit Board that construction or installation was performed in accordance with the approved plans and specifications on file with the Permit Board. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.D(1).)
4. The Permit Board shall be promptly notified in writing of any change in construction from the previously approved plans and specifications or permit. If the Permit Board determines the changes are substantial, it may require the submission of a new application to construct with “as built” plans and specifications. Notwithstanding any provision herein to the contrary, the acceptance of an “as built” application shall not constitute a waiver of the right to seek compliance penalties pursuant to State Law. (Ref.: 11 Miss. Admin. Code Pt. 2, R. 2.5.D(2).)

**PART II.**  
**EMISSION LIMITATIONS AND MONITORING REQUIREMENTS**

Beginning upon permit issuance, the permittee is authorized to modify air emissions equipment for the emission of air contaminants from Emission Point AD-005, the Primary Reformer, as a result of a combination of maintenance, debottleneck, and optimization projects known as the 2012 Ammonia Plant Turnaround.

The air emissions equipment shall be constructed and operated to comply with the emission limitations and monitoring requirements specified below.

**LIMITATIONS**

Permittee shall comply with the following federally enforceable limits on the Primary Reformer (AD-005) and Ammonia Plant, related to total NOx emissions as a result of the 2012 Ammonia Plant Turnaround.

173.31 lb/hr and 759.10 tpy of NOx

620,500 tons per year of ammonia production

9,022,800 MMBtu per year of total heat input to the Primary Reformer, AD-005  
(includes natural gas and purge gas to the Primary, Tunnel and Superheater burners,  
and the Auxiliary Boiler)

**MONITORING REQUIREMENTS**

To demonstrate compliance with the Primary Reformer hourly NOx emission limit, permittee shall perform a stack test prior to December 31<sup>st</sup> of each year for NOx emissions using EPA Reference Test Method 7E, or approved equivalent. The MDEQ Compliance and Enforcement Division must be notified at least ten (10) days prior to the scheduled test date so that an observer may be present to witness.

**RECORDKEEPING REQUIREMENTS**

To demonstrate compliance with the Primary Reformer heat input limit, permittee shall record the amount of each fuel (natural gas and purge gas), in standard cubic feet (scf), fired in each of the burner types (Primary, Tunnel and Superheater burners, and Auxiliary Boiler) for each calendar month. The permittee shall also calculate the total Primary Reformer heat input in MMBtu on a monthly basis and for each consecutive 12-month period by using the recorded monthly fuel usage and the heating value in btu/scf determined through annual analysis of each fuel using ASTM 3588, or approved equivalent.

To demonstrate compliance with the Ammonia Plant production limit, permittee shall record the ammonia production in short tons (2000 pounds) for each calendar month and calculate a total production rate for each consecutive 12-month period.

Permittee shall maintain records of all raw operating data and supporting calculations to document compliance with the above limits.



**PART II.**  
**EMISSION LIMITATIONS AND MONITORING REQUIREMENTS**

According to the schedules listed below, the following permit limitations and requirements will become effective for both the No.9 Nitric Acid Plant (AE-006) and the No.10 Nitric Acid Plant (AE-007).

**LIMITATIONS**

<b>Description</b>	<b>Limit (lb NOx/ton 100% nitric acid)</b>	<b>Compliance Deadline</b>
Short-Term NOx Limit <sup>4</sup>	1.0	March 31, 2012
Long-Term NOx Limit <sup>5</sup>	0.6	March 31, 2013

Effective June 6, 2011, permittee shall be subject to and in compliance with all applicable provisions of Standards of Performance for Nitric Acid Plants (40 CFR 60, Subpart G) and Standards of Performance for New Stationary Sources, General Provisions (40 CFR 60, Subpart A).

**MONITORING REQUIREMENTS**

Effective March 31, 2012, the monitoring requirements established in the applicable CEMS Plan (attached) shall be implemented.

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<sup>4</sup> Short-Term NOx Limit shall mean a 3-hour rolling average NOx emission limit (rolled hourly) expressed in terms of pounds of NOx emitted per ton of 100% Nitric Acid produced. The short-term NOx limit shall be calculated in accordance with the applicable CEMS Plan (attached).

<sup>5</sup> Long-Term NOx Limit shall mean a 365-day rolling average NOx emission limit (rolled daily) expressed in terms of pounds of NOx emitted per ton of 100% Nitric Acid produced. The long-term NOx limit shall be calculated in accordance with the applicable CEMS Plan (attached).

**PART III.  
OTHER REQUIREMENTS**

**Records:**

The permittee shall maintain on-site records of all required monitoring data and support information required by this permit for a period of at least five (5) years from the date of the monitoring sample, measurement, report, or application. These records shall be made available for review upon request from DEQ personnel.

**Reporting Deviations:**

The permittee shall report any deviations from the permit requirements, including deviations attributable to upsets, within five (5) working days of such deviation. The report shall also include the cause of the deviation(s) and any corrective action(s) or preventive measure(s) taken. A copy of the report shall be maintained in accordance with the Records provisions of this Part.

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# **A T T A C H M E N T**

## **CEMS Plan**



CEMS Plan from  
Consent Decree.pdf

**ATTACHMENT C**

**TERRA NITRIC ACID PLANT CEMS PLAN**  
**U.S. et. al. v. Terra Industries, Inc., et. al.**

**CEMS Plan for NO<sub>x</sub> Emissions**

**Terra Industries Inc., Terra Nitrogen, Limited Partnership, Terra International (Oklahoma) Inc., Port Neal Corporation, and Terra Mississippi Nitrogen, Inc.**  
**Covered Nitric Acid Plants**

**Principle**

This CEMS Plan is the mechanism for determining compliance with the Short-Term NO<sub>x</sub> Limit and Long-Term NO<sub>x</sub> Limit applicable to each Covered Nitric Acid Plant as specified in the Consent Decree and is used to evaluate the compliance status with the NSPS NO<sub>x</sub> limits. The methodology described in this CEMS Plan will provide a continuous indication of compliance with the above-referenced NO<sub>x</sub> emission limits established in the Consent Decree by accurately determining the emission rate in terms of pounds of NO<sub>x</sub> emitted per ton of 100% Nitric Acid Produced (lb/ton) as a rolling 3-hour average and a rolling 365-day average. The CEMS will utilize equipment to measure stack NO<sub>x</sub> concentration and the stack volumetric flow rate. From this data, real-time, accurate, and quality controlled measurements of the mass NO<sub>x</sub> emission rate can be obtained.

**Definitions**

Terms used in this CEMS Plan that are defined in the Clean Air Act ("CAA") or in Federal or state regulations promulgated pursuant to the CAA shall have the meaning assigned to them in the CAA or such regulations, unless otherwise defined in the Consent Decree. The terms used in this CEMS Plan that are defined in the Consent Decree shall have the meaning assigned to them therein. The following definitions specifically apply for purposes of this CEMS Plan.

- "CEMS" or "Continuous Emission Monitoring System" shall mean the total equipment, required under this CEMS Plan, used to sample and condition (if applicable), to analyze, and to provide a permanent record of emissions or process parameters.
- "Day," "day," or "calendar day" shall mean a calendar day.
- "Long-Term NO<sub>x</sub> Limit" shall mean a 365-day rolling average NO<sub>x</sub> emission limit (rolled daily) expressed as pounds of NO<sub>x</sub> emitted per ton of 100% Nitric Acid Produced ("lb/ton"); compliance with the Long-Term NO<sub>x</sub> Limit shall be calculated in accordance with this CEMS Plan. The Long-Term NO<sub>x</sub> Limit applies at all times, including during periods of Startup, Shutdown, or Malfunction.
- "Malfunction" shall mean, consistent with 40 C.F.R. § 60.2, any sudden, infrequent, and not reasonably preventable failure of air pollution control equipment, process equipment, or a process to operate in a normal or usual manner, but shall not include failures that are caused in whole or in part by poor maintenance or careless operation.

- “NSPS NO<sub>x</sub> Limit” shall mean the NO<sub>x</sub> emission limit expressed as 1.5 kg of NO<sub>x</sub> per metric ton of 100% Nitric Acid Produced (3 lb per ton) specified at 40 C.F.R. § 60.72(a)(1).
- “NO<sub>x</sub>” shall mean the pollutant nitrogen oxides. For the purposes of calculating mass emission rates, NO<sub>x</sub> has a molecular weight of 46.0055 lb/lb-mol.
- “NO<sub>x</sub> stack analyzer” shall mean that portion of the CEMS that senses NO<sub>x</sub> and generates an output proportional to the NO<sub>x</sub> concentration.
- “100% Nitric Acid Produced” shall mean the quantity of a nitric acid product manufactured by a Nitric Acid Plant multiplied by the concentration of actual nitric acid in the product. For example, if a Nitric Acid Plant produces 100 tons of a 54% nitric acid product, this equals 54 tons of 100% Nitric Acid Produced.
- “One-hour period” and “1-hour period” shall mean any 60-minute period commencing on the hour.
- “One-minute measurement” shall mean any single measurement or the arithmetic average of multiple measurements of a parameter during a one-minute period on-the-clock.
- “Operating Periods” shall mean periods during which a Covered Nitric Acid Plant is producing nitric acid and NO<sub>x</sub> is emitted, including periods of Startup, Shutdown and Malfunction.
- “Short-Term NO<sub>x</sub> Limit” shall mean a 3-hour rolling average NO<sub>x</sub> emission limit (rolled hourly) expressed in terms of pounds of NO<sub>x</sub> emitted per ton of 100% Nitric Acid Produced (“lb/ton”); compliance with the Short-Term NO<sub>x</sub> Limit shall be calculated in accordance with this CEMS Plan. The Short-Term NO<sub>x</sub> Limit does not apply during periods of Startup, Shutdown, or Malfunction.
- “Shutdown” shall mean the cessation of nitric acid production operations of a Covered Nitric Acid Plant for any reason. Shutdown begins at the time the feed of ammonia to the Covered Nitric Acid Plant ceases and ends 3 hours later.
- “Stack flowmeter” shall mean that portion of the CEMS that senses the volumetric flow rate and generates an output proportional to that flow rate.
- “Startup” shall mean the process of initiating nitric acid production operations of a Covered Nitric Acid Plant. Startup begins 1 hour prior to the initiation of the feed of ammonia to the Covered Nitric Acid Plant and ends no more than 5 hours after such initiation of the feed of ammonia.
- “Ton” or “tons” shall mean short ton or short tons. One Ton equals 2,000 pounds.

**Emissions Monitoring**

Emissions monitoring under this CEMS Plan will be done using a NO<sub>x</sub> stack analyzer and a stack flowmeter on each Covered Nitric Acid Plant. Except for periods of CEMS breakdowns, analyzer malfunctions, repairs, and required quality assurance or quality control activities (including calibration checks and required zero and span adjustments), Terra will conduct continuous monitoring pursuant to this CEMS Plan at each Covered Nitric Acid Plant during all Operating Periods as follows:

- Once every minute, the NO<sub>x</sub> stack analyzer will measure the stack NO<sub>x</sub> concentration, in parts per million by volume, dry basis (ppmvd) and the stack flowmeter will measure the volumetric flow rate in dry standard cubic feet per minute (DSCFM)<sup>1</sup>.
- For every 1-hour period (60-minute period commencing on the hour), the CEMS will reduce the 60 one-minute measurements generated by each analyzer by taking the arithmetic average of the previous 60 measurements during the 1-hour period. This data will be used to calculate the 3-hour average NO<sub>x</sub> emission rate.

**Backup Monitoring Procedure for Long-Term NO<sub>x</sub> Limit**

In the event that the NO<sub>x</sub> stack analyzer and/or stack flowmeter is/are not available or is/are out-of-control, Terra will implement the following backup monitoring procedure. The resulting data will be used to calculate the 365-day average NO<sub>x</sub> emission rate.

- Other than as specified below for a CEMS outage or out-of-control period less than 24 consecutive hours, Terra will comply with the following requirements to fill in data gaps in the array:
  - Exit stack gas will be sampled and analyzed for NO<sub>x</sub> at least once every three (3) hours, during all Operating Periods. Sampling will be conducted by making physical measurements of the NO<sub>x</sub> concentration in the gas stream to the main stack using alternative/non-CEMS methods (e.g., through the use of a portable analyzer or non-certified NO<sub>x</sub> stack analyzer). The reading obtained will be substituted for the 180 (or less) one-minute measurements that would otherwise be utilized if the CEMS were operating normally. Alternatively, Terra may conduct the required sampling and analysis using a redundant certified NO<sub>x</sub> analyzer.
  - Stack volumetric flow rate will be estimated using engineering judgment.
- During required quality assurance or quality control activities (including calibration checks and required zero and span adjustments) of the CEMS and stack flowmeter, Terra may utilize the previous calendar day average value to fill in the data gaps.

<sup>1</sup> For the purposes of the calculations under this CEMS Plan, as-is volumetric flow rate measurements will be assumed to be dry. However, Terra may adjust for any moisture contained in the stack gas if the Covered Nitric Acid Plant is equipped with a continuous moisture analyzer.

- If any one or more than one of the CEMS or stack flowmeter is/are not operating for a period of less than 24 consecutive hours due to breakdowns, malfunctions, repairs, or out-of-control period of the same, Terra may utilize the previous calendar day average value recorded for each to fill in the data gaps.

### **Production Data**

Following each calendar day at each Covered Nitric Acid Plant, Terra will record the quantity of nitric acid produced during that day and the average strength of the nitric acid produced during that day. From this information, Terra will calculate the 100% Nitric Acid Produced for that day, in units of tons per day.

### **Conversion Factor**

During each performance test for each Covered Nitric Acid Plant required under Paragraph 24 of the Consent Decree, Terra will develop a conversion factor, in units of lb/ton of 100% Nitric Acid Produced per ppmvd consistent with 40 C.F.R. § 60.73(b).

### **Emissions Calculations**

#### **Rolling 3-Hour Average**

Compliance with the Short-Term NO<sub>x</sub> Limit shall be based on a rolling 3-hour average (rolled hourly). For purposes of calculating a rolling 3-hour average NO<sub>x</sub> emission rate, the CEMS will maintain an array of the 3 most recent and contiguous 1-hour period average measurements of stack NO<sub>x</sub> concentration. Every hour, it will add the most recent 1-hour period average measurement to the array and exclude the oldest 1-hour period average measurement. Data generated using the backup monitoring procedure, specified above, need not be included in this calculation.

The rolling 3-hour average lb/ton NO<sub>x</sub> emission rate ( $E_{3hravg}$ ) will then be calculated every hour using Equation 1.

Equation 1:

$$E_{3hravg} = \frac{K \cdot \sum_{i=1}^3 C_{NOx\ i}}{3}$$



Where:

$$\begin{aligned}
 C_{NO_x i} &= \text{Arithmetic average of 60 one-minute measurements of stack NO}_x \text{ concentration, parts per million by volume, dry basis (ppmvd) in a 1-hour period.} \\
 K &= \text{Conversion factor determined during most recent NO}_x \text{ performance test (lb/ton of 100\% Nitric Acid Produced per ppm)} \\
 E_{3hravg} &= \text{3-hour average lb NO}_x \text{ per ton 100\% Nitric Acid Produced}
 \end{aligned}$$

### Rolling 365-Day Average

Compliance with the Long-Term NO<sub>x</sub> Limit shall be based on a rolling 365-day average (rolled daily). For the purposes of calculating the 365-day average NO<sub>x</sub> emission rate each calendar day at each Covered Nitric Acid Plant, Terra will maintain an array of the mass emissions (lb/day) of NO<sub>x</sub> (calculated using Equation 2) and the 100% Nitric Acid Produced for that day (tons/day) and the preceding 364 days. Each subsequent day, the data from that day will be added to the array, and the data from the oldest day will be excluded.

For the purposes of calculating daily mass emission rate, the CEMS will maintain an array of each one-minute measurement of the NO<sub>x</sub> concentration (ppmvd) at the exit stack and each one-minute measurement of volumetric flow rate (DSCFM) of the exit stack over each day. In the event that one or more of the CEMS and stack flowmeter is/are not available, Terra will use the backup monitoring procedure, specified above, to fill in the data gaps.

Following each calendar day, the daily NO<sub>x</sub> mass emissions will be calculated using Equation 2.

### Equation 2:

$$M_{NO_x Day} = 1.193 \times 10^{-7} \cdot \sum_{i=1}^n Q_{Stack i} \cdot C_{NO_x i}$$

Where:

$$\begin{aligned}
 C_{NO_x i} &= \text{One-minute measurement of stack NO}_x \text{ concentration, ppmvd, at interval "i"} \\
 Q_{Stack i} &= \text{One-minute measurement of stack volumetric flow rate, DSCFM, at interval "i"} \\
 1.193 \times 10^{-7} &= \text{Conversion factor in units of pounds per standard cubic foot (lb/SCF) NO}_x \text{ per ppm} \\
 M_{NO_x Day} &= \text{Mass emissions of NO}_x \text{ during a calendar day, lb} \\
 n &= \text{Number of minutes of Operating Period in a calendar day}
 \end{aligned}$$

Following each calendar day, the NO<sub>x</sub> emission rate as lb/ton, averaged over a rolling 365-day period ( $E_{365-Day Avg}$ ) will be calculated using Equation 3.

Equation 3:

$$E_{365\text{-Day Avg}} = \frac{\sum_{d=1}^{365} M_{NO_x \text{ Day } d}}{\sum_{d=1}^{365} P_d}$$

Where:

$$\begin{aligned} M_{NO_x \text{ Day } d} &= \text{Mass emissions of NO}_x \text{ during a calendar day "d", lb} \\ P_d &= 100\% \text{ Nitric Acid Produced during a calendar day "d", tons} \\ E_{365\text{-Day Avg}} &= 365\text{-day rolling average lb NO}_x \text{ per ton of 100\% Nitric Acid Produced} \end{aligned}$$

**Rounding of Numbers resulting from Calculations**

Upon completion of the calculations, the final numbers shall be rounded as follows:

$$\begin{aligned} E_{3hravg} &: \text{Rounded to the nearest tenth.} \\ E_{365\text{-Day Avg}} &: \text{Rounded to the nearest hundredth.} \end{aligned}$$

The numbers "5"- "9" shall be rounded up, and the numbers "1"- "4" shall be rounded down. Thus, "1.05" shall be rounded to "1.1", and "1.04" shall be rounded to "1.0".

**Compliance with Consent Decree NO<sub>x</sub> Limits****Short-Term NO<sub>x</sub> Limits**

The Short-Term NO<sub>x</sub> Limits do not apply during periods of Startup, Shutdown, or Malfunction. During all other Operating Periods at a Covered Nitric Acid Plant, Terra will be in compliance with the Short-Term NO<sub>x</sub> Limit specified in the Consent Decree if  $E_{3hravg}$  does not exceed 1.0 lb of NO<sub>x</sub> per ton of 100% Nitric Acid Produced. If Terra contends that any 3-hour rolling average emission rate is in excess of 1.0 lb/ton due to the inclusion of hours of Startup, Shutdown or Malfunction in the 3-hour period, Terra shall recalculate  $E_{3hravg}$  to exclude measurements recorded during the period(s) of the claimed Startup, Shutdown or Malfunction(s). Nothing in this CEMS Plan shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a Covered Nitric Acid Plant would have been in compliance with the Short-Term Limit if the appropriate performance test or compliance procedure had been performed.

C11-4038

Exhibit C

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NSPS NO<sub>x</sub> Limits

The NSPS NO<sub>x</sub> Limit does not apply during periods of Startup, Shutdown, or Malfunction. During all other Operating Periods at a Covered Nitric Acid Plant, Terra will be in compliance with the NSPS Limit if  $E_{3hravg}$  does not exceed 3.0 lb of NO<sub>x</sub> per ton of 100% Nitric Acid Produced. If Terra contends that any 3-hour rolling average emission rate is in excess of 3.0 lb/ton due to the inclusion of hours of Startup, Shutdown or Malfunction in the 3-hour period, Terra shall recalculate  $E_{3hravg}$  to exclude measurements recorded during the period(s) of the claimed Startup, Shutdown or Malfunction(s). Nothing in this CEMS Plan shall preclude the use, including the exclusive use, of any credible evidence or information, relevant to whether a Covered Nitric Acid Plant would have been in compliance with the NSPS NO<sub>x</sub> Limit if the appropriate performance test or compliance procedure had been performed.

Long-Term NO<sub>x</sub> Limits

Terra will be in compliance with the Long-Term NO<sub>x</sub> Limit specified in the Consent Decree if  $E_{365-Day Avg}$  does not exceed 0.60 lb of NO<sub>x</sub> per ton of 100% Nitric Acid Produced. The Long-Term NO<sub>x</sub> Limit applies at all times, including during periods of Startup, Shutdown, or Malfunction.

Retention of All CEMS Data, including Data during Startup, Shutdown, and Malfunction

Terra will retain all data generated by the NO<sub>x</sub> analyzer and stack flowmeter, including all data generated during Startup, Shutdown, and/or Malfunction (“SSM”) at each Covered Nitric Acid Plant in accordance with Section XI of the Consent Decree.

Analyzer Specifications

The NO<sub>x</sub> stack analyzers and the stack flowmeter required under this CEMS Plan at each Covered Nitric Acid Plant will meet the following specifications:

**Table 1**

<b>Analyzer</b>	<b>Parameter</b>	<b>Location</b>	<b>Range/Span Value</b>
NO <sub>x</sub> Stack Analyzers	NO <sub>x</sub> , ppm by volume, dry basis	Stack	Dual range: Normal: 0 – 200 ppm NO <sub>x</sub> SSM: 0 – 5000 ppm NO <sub>x</sub>
Stack Flowmeter	Volumetric flow rate, SCFM	Stack	0 to 125% of the maximum expected volumetric flow rate

The NO<sub>x</sub> stack analyzers will meet all applicable requirements of 40 C.F.R. §§ 60.11, 60.13, 40 C.F.R. Part 60, Appendix B, Performance Specification 2, and the Quality Assurance and Quality Control Procedures in 40 C.F.R. Part 60, Appendix F, Procedure 1. It should be noted, however, that the daily drift test requirement at 40 C.F.R. § 60.13(d) and the requirements of Appendix F apply only to the normal range of the NO<sub>x</sub> stack analyzers. The SSM range of the NO<sub>x</sub> stack analyzers will be evaluated once each calendar quarter to verify accuracy.

The stack flowmeters will meet 40 C.F.R. Part 60, Appendix B, Performance Specification 6 and will be evaluated once each calendar quarter and during the RATA of the NO<sub>x</sub> stack analyzers to verify accuracy.

**Compliance with the NSPS: 40 C.F.R. Part 60, Subpart G**

In addition to the requirements in this CEMS Plan, Terra also will comply with all of the requirements of the NSPS relating to monitoring at each Covered Nitric Acid Plant except that, pursuant to 40 C.F.R. § 60.13(i), this CEMS Plan will supersede the following provisions of 40 C.F.R. Part 60, Subpart G:

- The requirement at 40 C.F.R. § 60.73(a) that the NO<sub>x</sub> stack analyzers have a span value of 500 ppm. In lieu of this, Terra will utilize the span values specified in Table 1 of this CEMS Plan; and
- The requirement at 40 C.F.R. § 60.73(a) that pollutant gas mixtures under Performance Specification 2 and for calibration checks under 40 C.F.R. § 60.13(d) be nitrogen dioxide (NO<sub>2</sub>). Terra will use calibration gases containing NO and/or NO<sub>2</sub> as appropriate to assure accuracy of the NO<sub>x</sub> stack analyzers except where verified reference cells are used in accordance with Performance Specification 2.