



Monitoring Plan

Nitric Acid Production N₂O Abatement Project
Ascend Performance Materials Nitric Acid Plant

Ascend Performance Materials
Cantonment, FL

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Document Version History

Version	Update Description	Date	Owner
1.0	Initial creation of the Monitoring Plan	10/06/2021	Wendy Kramer
2.0	Improvements from Readiness Review	8/26/2022	Wendy Kramer
3.0	Updated AOC Values in 3.1.2 and Baseline 3.2	4/25/2023	Wendy Kramer

Document Purpose

The purpose of this document is the establishment of a Monitoring Plan per the Climate Action Reserve (CAR) Nitric Acid Production Protocol V2.2 for all monitoring and reporting activities associated with the N₂O Abatement Project at the Ascend Performance Materials Nitric Acid plant in Cantonment, Florida. The Monitoring Plan will serve as the basis for verifiers to confirm that the monitoring and reporting requirements in Section 6 and Section 7 of the Nitric Acid Production Protocol V2.2 have been and will continue to be met, and that consistent, rigorous monitoring and record-keeping is ongoing at the project site.

Table of Contents

1	PROJECT SUMMARY	5
1.1	Project Description.....	5
2	PROJECT MONITORING.....	5
2.1	QA/QC Requirements.....	6
3	MONITORING PARAMETERS.....	7
3.1	General Project Parameters	10
3.2	Baseline Calculation Parameters.....	14
3.3	Project Calculation Parameters.....	18
4	CONTINUOUS EMISSIONS MONITORING REQUIREMENTS	19
4.1	Initial system Certification	20
4.2	Daily CEMS Calibration Procedures.....	21
4.3	Quarterly Analyzer and Flow Checks.....	23
4.4	Annual CEMS Relative Accuracy Test Audit (RATA) Procedures	24
5	INITIAL CERTIFICATION ACTIVITIES	27
5.1	7-Day CEMS Drift Check	27
5.2	CEMS Cycle Time Check	27
5.3	DAHS Verification	27
5.4	Data Substitution Requirements.....	28
5.5	CEMS File Storage Requirements.....	29
6	CEMS MODIFICATION AND CHANGE PROCEDURES.....	29
7	PROCESS DIAGRAM.....	31

1 Project Summary

1.1 Project Description

The Ascend Performance Materials Nitric Acid Production Plant in Cantonment, Florida has installed a secondary catalyst immediately downstream of the ammonia oxidation catalyst to reduce the nitrous oxide (N₂O) emissions formed in the ammonia oxidizer (a.k.a. ammonia burner). Because Ascend Performance Materials voluntarily chose to install the secondary catalyst in the absence of federal, state or local regulations or other legally binding mandates that would have required such reductions it is eligible to apply for emission reduction credits under the Climate Action Reserve's Nitric Acid Production Project Protocol Version 2.2 (Protocol). Provided it continues to meet the legal requirement tests under Section 3 of the Protocol, Ascend Performance Materials may use these procedures to calculate the eligible GHG emission credits associated with the N₂O abatement project over a ten-year crediting period and may apply for a second ten-year second crediting period within the final six months of the initial crediting period.

2 Project Monitoring

The Monitoring Plan will serve as the basis for verifiers to confirm that the monitoring and reporting requirements in Section 6 and Section 7 of the Protocol have been and will continue to be met, and that consistent, rigorous monitoring and record keeping is ongoing at the project site.

The project at Ascend Performance Materials' Nitric Acid Production Plant will be closely monitored, metered, and recorded. The management and operation of the proposed nitrous oxide abatement project will be the responsibility of Ascend Performance Materials. Ascend Performance Materials will serve as the Project Developer and will be responsible for the overall program management. After each primary gauze campaign reporting of the emissions reductions generated by the project will be produced and submitted by Ascend Performance Materials. The emission reductions will be verified each campaign by an independent third-party verifier.

The relation between the project operational and management structure, and other participants of the project, is described as follows:

- The Analytical Technology Supervisor and Electrical Maintenance Supervisor will be responsible for the ongoing operation and maintenance of the N₂O monitoring system. Operation, maintenance, calibration, and service intervals will be done according to the manufacturer specifications and incorporated into standard procedures.
- The Principal Strategy & Growth Analyst will be responsible for overall program oversight, training, and the development of all monitoring reports and oversight of the third-party verification firm.
- The Specialty Chemicals Process Engineer will be responsible for monitoring the automated measuring system (AMS) / data acquisition and handling system (DAHS) that are installed to measure and acquire both emission and process data.
- The Specialty Chemicals Process Engineer will be responsible for collecting relevant operating data and processing the data generated by the DAHS. This data will be entered into

a spreadsheet specifically designed for this monitoring plan and can be required to create a report, at any time.

- The Specialty Chemicals Process Engineer is responsible for ensuring the correct implementation of the project and its compliance with the Nitric Acid Production Protocol and other relevant standards at the plant level. The Process Engineer will routinely report to the VP Specialty Chemicals as to the overall progress of the project.

The Plant Data Acquisition System (DAS) is managed by a QA Enterprise Advantage System. The QA Enterprise Advantage System reads data from the CEMS Allen Bradley PLC and stores the information in its own database (SQL Server) for viewing and reporting. Ascend IP.21 AspenTech process data historian is configured to write the values of several tags to the CEMS PLC so that the application can perform the required calculations and store required data.

Additionally, the QA Site Advantage data acquisition and handling system (DAHS) includes a virtual server supplied by Ascend Performance Materials and a QA Emission Point PC. This PC will serve as a local HMI and engineering workstation as well as provide additional data warehousing capability to serve the data to the virtual server. The QA Enterprise Advantage System resides on VM “PENPAPP29” and connects to a SQL Server database instance SQL05 residing on VM “PENPDBA21”. An additional HMI computer is located at the 467-operator shack and communicates with the CEMS PLC as well as the QA server.

Reports generated by the CEMS DAHS are listed below:

- Minute and hourly average emission data reports
- User defined queries allow customized emission reports to be generated as needed
- CEMS daily analyzer calibration results
- Required operational data is also recorded in CEMS / DAHS and is included in the reporting functions
- In addition to emission and CEMS audit reporting, the CEMS DAHS monitors and reports system alarms

2.1 QA/QC Requirements

The following QA/QC requirements will be met.

- Procedures for the preventive maintenance of the monitoring system
- Preventative Maintenance record-keeping and reporting procedures
- Testing, maintenance, and repair activity records for CEMS or any component of CEMS
- Ensuring adequate spare parts inventory for timely repair of CEMS
- Calibration error test and linearity check, cycle time procedures.

The Electrical and Instrumentation Maintenance Department in addition to the Online Analyzer and Environmental Departments will be responsible for the following QA/QC requirements:

- RATA procedures, such as sampling and analysis methods
- Record-keeping and reporting procedures
- 7 Day drift tests

3 Monitoring Parameters

For reporting purposes under the Protocol, Ascend Performance Materials will calculate the emission reductions associated with the N₂O abatement project over each campaign, where a campaign is defined under the Protocol as beginning when nitric acid production commences after the installation of a new primary catalyst gauze and ends when production ceases to replace the primary catalyst gauze. For each campaign, Ascend Performance Materials will follow the procedures in Section 5 of the Protocol to calculate the emission reductions by subtracting the “Project Emissions” measured during the reporting period from the “Baseline Emissions,” which represents what the emissions could have been in the absence of the N₂O abatement project. The baseline emissions for the reporting period are estimated based on the operation during the reporting period and an emission factor developed based on measurements made during the campaign prior to the initial installation of the secondary catalyst, but the reductions are limited if the nitric acid production exceeds the average production during previous campaigns before the N₂O abatement project.

3.1 Historical Data Analysis

In accordance with Sections 5.1.1 and 5.1.2 of the Protocol, Ascend Performance Materials analyzed the historic operating data to determine the historical maximum annual average total output of 100% concentration nitric acid and to define Allowable Operating Conditions, which are intended to ensure that the data used in the emission reduction calculations are representative.

3.1.1 Maximum Annual Nitric Acid Output

Ascend Performance Materials reviewed five consecutive years of data prior to the beginning of the N₂O abatement project (2017 – 2021) to determine the historical maximum annual average total output of 100% concentration nitric acid. For each of the five years, the average nitric acid production was determined by averaging production data over the 12-month period, excluding days when the nitric acid plant was not operating. The highest one-year average for this period, expressed as a maximum daily rate was 1119 metric tons/day.

While the potential output of the nitric acid plant is not limited to this “maximum” value, if the average output during any campaign exceeds this threshold, the Protocol limits the emission reductions that can be claimed in conjunction with that additional production. While the emission reductions associated with any nitric acid produced up to the maximum daily rate (i.e., scaled over the reporting period) is calculated using the baseline emission factor determined based on the emissions measured prior to the installation of the secondary catalyst, the reductions associated with any nitric acid produced over the maximum rate is calculated using the “default baseline emission factor for new production” of 0.0025 tN₂O/tHNO₃ from Table B-1 of the Protocol.

3.1.2 Allowable Operating Conditions and Campaign Production Volume Cap

Following the procedures in Section 5.1.2 of the Protocol, Ascend Performance Materials established allowable operating conditions (AOC) defining minimum and maximum ranges for the oxidation temperature and pressure as well as a maximum ammonia-to-air ratio to use to ensure that data collected during the baseline sampling period are representative of typical emissions and that the operating conditions remain comparable during subsequent campaigns.

The following table shows the allowable operating conditions that were determined using the best available historical data for the operating ranges of temperature and pressure, and maximum ammonia-to-air ratio from five previous campaigns (gauze pack numbers and start dates: #118-6/7/2019, #119-9/27/2019, #121-10/1/2020, #122-2/11/2021, and #123-7/12/2021).

[Note: Analysis excludes the use of gauze pack #120 installed in February 2020 and “emergency pack #EP1” installed in June 2020. Gauze pack #120 campaign is not representative of typical operation. It was used during initial months of COVID-19 pandemic and was operated for significantly more operating days (177) than normal and therefore significantly more nitric acid was produced during this campaign. Operation with the emergency pack #EP1, which was only designed for 45-days of use and used for 28 operating days, is also deemed atypical and would not represent the normal operation intended to be reflected in the allowable operating conditions under the Protocol. The target campaign length for Ascend is 120 operating days and historical average is 112 operating days.]

Ascend has determined that no valid historical data for ammonia-to-air ratio exists during the previous five campaigns used for determination of the AOC. Since no valid historical data are available Ascend received concurrence from CAR that the maximum ammonia-to-air ratio can be determined by source (c) per the protocol and be specified by the ammonia oxidation catalyst manufacturer or the operating manual for the NAP equipment if guidance from the ammonia oxidation catalyst manufacturer is not available.

Allowable Operating Conditions

Operating Condition	Minimum	Maximum
Oxidation Temperature (°C) (Baseline Only)	885.03	900.47
Oxidation Pressure (psia)	130.70 (9.01 bara)	155.70 (10.74 bara)
NH ₃ /Air (mol%) (from Oxidation catalyst manufacturer)	NA	11.00

Ascend Performance Materials used the same previous five campaigns to determine the campaign production volume cap. The campaign production volume cap (CPV_{cap}) is defined as the average campaign production volume (in metric tons HNO₃) for the campaigns used to define the allowable operating conditions. The average production volume during the five campaigns was 111,728 metric tons. If the volume of nitric acid produced during the baseline sampling period exceeds the 111,728 metric ton cap, any data collected after that threshold is reached is excluded from the calculation of the baseline emission factor.

A Project Variance was requested to allow the Oxidation Temperature AOC range be changed for all crediting period campaigns due to a modification made to the Nitric Acid Plant during the installation of the secondary abatement catalyst that changed the location of the temperature

relative to the primary catalyst gauze. Due to the change the temperature readings going forward are no longer comparable to the past campaigns. The variance authorizes use of the specified temperature range found in the operating manual. The table below is the revised Oxidation Temperature AOC Range for crediting periods.

Allowable Operating Conditions - Variance

Operating Condition	Minimum	Maximum
Oxidation Temperature (°C) (Crediting Period Only)	593	927

3.2 Baseline Emission Factor

Ascend Performance Materials started the sampling campaign used to categorize the baseline emissions on 11/18/2021 prior to the installation of the secondary catalyst. The baseline emission factor was calculated based on the emissions monitored during the campaign in accordance with the Protocol and the applicable provisions of 40 CFR Part 75 (Part 75) as described in this monitoring plan, excluding the data for hours when the nitric acid plant operated outside the allowable operating conditions defined in the previous section. Because the nitric acid production during the sample campaign exceeded the campaign production volume cap, only the data for the hours prior to when the cap was reached was included in the calculations.

The results of the baseline sampling period and the baseline emission factor are summarized below:

Effective Start (Beginning of NH ₃ flow):	11/21/21 13:00
Effective End (Before Exceeding Production Cap):	3/12/22 08:00
Operation within Allowable Conditions (%)	97.76
Baseline Campaign Mean Oxidation Temperature (°C)	894.84
Baseline Campaign Mean Oxidation Pressure (psia)	146.83 (10.12 bara)
Baseline Campaign Mean Ammonia Concentration (mol%)	8.44
Baseline Mean Stack Gas Flow (m ³ /hr @ 101.325 kPa, 0 °C)*	150,801.61
Baseline Mean N ₂ O Concentration (mgN ₂ O/nm ³ @ 101.325 kPa, 0 °C)*	2.019E-06
Baseline Operating Hours (hr)*	2,600.00
Baseline Nitric Acid Production (tHNO ₃)*	109,168.58
Baseline N ₂ O Mass Emissions (tN ₂ O)	791.52
Baseline Emission Factor (tN ₂ O/tHNO ₃)	0.0072504

* Excluding Operating Hours outside of allowable operating conditions

With over 97% of the operating hours meeting the allowable operating conditions, the baseline sampling period met the Protocol requirement that more than 50% of campaign operation be within the allowable ranges for the N₂O emissions data to be considered valid. The baseline sample period also met the additional requirement that the mean values for oxidation temperature, oxidation pressure, and ammonia-to-air ratio be within the corresponding acceptable operating condition ranges defined for each parameter.

3.3 Project Emissions

During subsequent campaigns, the Project Emissions will be calculated and validated following the same procedures as applied to determine the baseline emission factor with the exception that no project data are eliminated that fall outside the allowable operating conditions. However, for each campaign, at least 50% of hourly values as well as the mean values for oxidation temperature, oxidation pressure, and ammonia-to-air ratio must fall within the allowable operating conditions for the results to be considered valid and emission reductions to be claimed for the campaign.

3.4 General Project Parameters

As specified by the Protocol, Ascend Performance Materials shall maintain electronic records related to the project for 10 years from the date of generation or a minimum of 7 years from the date of the last verification.

3.5 General Project Parameters

Data / Parameter:	Regulations
Data unit:	All Applicable Regulations
Description:	Project Developer attestation of compliance with regulatory requirements relating to the abatement project
Source of data:	Environmental Regulations
Measurement procedures (if any):	The Environmental Engineer will monitor periodicals, websites, newsletters, or other materials provided by trade associations, legal advocacy groups, and pertinent government websites to ensure that there are no laws, statutes, rules, regulations, ordinances, court orders, governmental agency actions, enforcement actions, environmental mitigation agreements, permitting conditions, permits, or other legally binding mandates requiring the abatement of N ₂ O at the project site.
Value Applied:	N/A
Measurement frequency:	Each verification
QA/QC procedures:	N/A
Any comment:	Information used to: 1. Demonstrate ability to meet the Legal Requirements Test – where

	regulation would require the abatement of N₂O or the installation of certain NO_x emission control technology that will impact N₂O emissions at a NAP 2. Demonstrate compliance with associated environmental rules, e.g. criteria pollutant emission standards, health and safety, etc., related to the N₂O abatement project.
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Data / Parameter:	OTh
Data unit:	degC
Description:	Oxidation Temperature
Source of data:	Measured by 467TC343
Measurement procedures (if any):	Delta V to IP21Historian to DAHS PLC ; data transferred once per minute; hourly average calculated from the minute data
Value Applied:	N/A
Measurement frequency:	Every hour
QA/QC procedures:	Inspection and Calibration PM by E&I Maintenance
Any comment:	

Data / Parameter:	OPh
Data unit:	PSIA (converted to bara)
Description:	Oxidation Pressure
Source of data:	Measured by 467PI140
Measurement procedures (if any):	Delta V to IP21Historian to DAHS PLC ; data transferred once per minute; hourly average calculated from the minute data. Pressure is measured in PSIA and can be converted to bara (1 bar = 14.504 psi).
Value Applied:	N/A
Measurement frequency:	Every hour
QA/QC procedures:	Inspection and Calibration PM by E&I Maintenance
Any comment:	

Data / Parameter:	OTnormal
Data unit:	degC
Description:	Allowable range for oxidation temperature
Source of data:	Calculated
Measurement procedures (if any):	
Value Applied:	
Measurement frequency:	Once
QA/QC procedures:	The information will be stored in electronic records for 10 years from the date of generation or a minimum of 7 years from the date of the last

Nitric Acid N₂O Abatement Monitoring Plan

	verification.
Any comment:	

Data / Parameter:	OPnormal
Data unit:	PSIA (converted to bara)
Description:	Allowable range for oxidation pressure.
Source of data:	Calculated
Measurement procedures (if any):	
Value Applied:	
Measurement frequency:	Once
QA/QC procedures:	The information will be stored in electronic records for 10 years from the date of generation or a minimum of 7 years from the date of the last verification.
Any comment:	

Data / Parameter:	Ammonia-to-air ratio
Data unit:	mol-%
Description:	Ammonia-to-air ratio
Source of data:	Measured and calculated 467CAL329
Measurement procedures (if any):	Delta V to IP21Historian to DAHS PLC ; data transferred once per minute; hourly average calculated from the minute data. Calculation can be found in CFD.
Value Applied:	
Monitoring frequency:	Every hour
QA/QC procedures:	Inspection and Calibration PM by E&I Maintenance
Any comment:	

Parameter:	Maximum ammonia-to-air ratio
Data unit:	mol-%
Description:	Maximum ammonia-to-air ratio
Source of data:	Calculated
Measurement procedures (if any):	
Value Applied:	
Measurement Frequency	Once
QA/QC Procedures	
Any comment:	

Nitric Acid N₂O Abatement Monitoring Plan

Data / Parameter:	CPVcap
Data unit:	tCO ₂ e
Description:	Campaign production volume cap
Source of data:	calculated
Measurement procedures (if any):	
Value Applied:	
Measurement frequency:	Once
QA/QC procedures:	
Any comment:	

Data / Parameter:	ER
Data unit:	tCO ₂ e
Description:	Emissions reductions for the reporting period
Source of data:	calculated
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Per reporting period
QA/QC procedures:	The information will be stored in electronic records for 10 years from the date of generation or a minimum of 7 years from the date of the last verification.
Any comment:	

Data / Parameter:	HN0 ₃ ,max, scaled
Data unit:	tHN0 ₃
Description:	HN0 ₃ ,max, scaled to the length of the campaign
Source of data:	calculated
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Per campaign
QA/QC procedures:	
Any comment:	

Data / Parameter:	HN0 ₃ ,max
Data unit:	tHN0 ₃ /day
Description:	Historical maximum annual average nitric acid production
Source of data:	calculated

Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	
QA/QC procedures:	
Any comment:	

Data / Parameter:	ODn
Data unit:	days
Description:	Days of operation in the campaign for which HNO ₃ ,max, scaled is being calculated
Source of data:	Operating records
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Per campaign
QA/QC procedures:	
Any comment:	

3.6 Baseline Calculation Parameters

Data / Parameter:	BE
Data unit:	tCO ₂ e
Description:	Baseline emissions for the reporting period
Source of data:	Calculated
Measurement procedures (if any):	N/A
Value Applied:	
Monitoring frequency:	Per reporting period
QA/QC procedures:	N/A
Any comment:	Emissions that would have occurred in the absence of the project activity.

Nitric Acid N₂O Abatement Monitoring Plan

Data / Parameter:	EFbl
Data unit:	tN ₂ O/tHNO ₃
Description:	Baseline emission factor
Source of data:	Calculated
Measurement procedures (if any):	N/A
Value Applied:	
Measurement frequency:	Calculated once for the reporting period
QA/QC procedures:	N/A
Any comment:	

Data / Parameter:	HNO ₃ ,rp,scaled
Data unit:	tHNO ₃
Description:	Quantity of nitric acid production used to quantify emission reductions, not exceeding HNO ₃ , max, scaled
Source of data:	Calculated
Measurement procedures (if any):	N/A
Value Applied:	
Monitoring frequency:	Per reporting period
QA/QC procedures:	N/A
Any comment:	

Data / Parameter:	EFnew
Data unit:	tN ₂ O/tHNO ₃
Description:	Default baseline emission factor for production above HNO ₃ ,max, scaled
Source of data:	Reference value
Measurement procedures (if any):	N/A
Value Applied:	
Monitoring frequency:	Per reporting period
QA/QC procedures:	N/A
Any comment:	

Nitric Acid N₂O Abatement Monitoring Plan

Data / Parameter:	HN03,new
Data unit:	tHN03
Description:	Quantity of nitric acid production by which HN03,rp exceeds HN03, max, scaled
Source of data:	Calculated
Measurement procedures (if any):	N/A
Value Applied:	
Monitoring frequency:	Once
QA/QC procedures:	N/A
Any comment:	

Data / Parameter:	N2Obl
Data unit:	tN2O
Description:	Total N2O emissions during the baseline sampling period
Source of data:	measured
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Continuously, total for the campaign
QA/QC procedures:	
Any comment:	

Data / Parameter:	HN03,bl
Data unit:	tHN02
Description:	Nitric acid (100% concentrated) produced over baseline campaign
Source of data:	Operating records
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	
QA/QC procedures:	
Any comment:	

Nitric Acid N₂O Abatement Monitoring Plan

Data / Parameter:	Fbl
Data unit:	m ³ /hour
Description:	Volume flow rate of the stack gas expressed in normal conditions (101.325 kPa, 0 °C)
Source of data:	Measured
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Every one minute
QA/QC procedures:	
Any comment:	

Data / Parameter:	N2Oconc,bl
Data unit:	tN2O/m ³
Description:	N2O concentration in the stack gas at normal conditions (101.325 kPa, 0 °C)
Source of data:	Measured
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Data collected using a gas analyzer and processed using appropriate software programs. The analyzer will be calibrated according to manufacturer specification and recognized industry standards. This measurement is taken in the stack gas.
QA/QC procedures:	
Any comment:	

Data / Parameter:	OHbl
Data unit:	hours
Description:	Operating hours
Source of data:	Measured, Operating Records
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	
QA/QC procedures:	
Any comment:	

3.3 Project Calculation Parameters

Data / Parameter:	PE
Data unit:	tCO ₂ e
Description:	Project emissions during the reporting period
Source of data:	Calculated
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Per Reporting Period
QA/QC procedures:	N/A
Any comment:	Emissions resulting from project activities

Data / Parameter:	N ₂ O _n
Data unit:	tN ₂ O
Description:	Total N ₂ O emissions during the project campaign
Source of data:	Calculated
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Per campaign
QA/QC procedures:	N/A
Any comment:	

Data / Parameter:	Fn
Data unit:	M ³ /hour
Description:	Volume flow rate of the stack gas expressed in normal conditions (101.325 kPa, 0 °C)
Source of data:	measured
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Per campaign

QA/QC procedures:	
Any comment:	

Data / Parameter:	N ₂ O conc,n
Data unit:	tN ₂ O/m ³
Description:	N ₂ O concentration in the stack gas at normal conditions (101.325 kPa, 0 °C)
Source of data:	measured
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	Per campaign
QA/QC procedures:	
Any comment:	

Data / Parameter:	OHn
Data unit:	hours
Description:	Operating hours during the project campaign
Source of data:	Operating Records
Measurement procedures (if any):	
Value Applied:	
Monitoring frequency:	
QA/QC procedures:	
Any comment:	

4 Continuous Emissions Monitoring Requirements

Direct measurement of N₂O concentration in the stack gas and the flow rate of the stack gas will be made using a continuous monitoring system. Ascend Performance Materials has installed the following CEMS equipment:

Nitric Acid Stack N₂O Analyzer

- Manufacturer : Thermo Fisher Scientific
- Model No. : EM-46iHL-ALNPCA
- Serial No. : 12109511653
- Instrument No.: 467AI692

- Range : 0-2000 ppm by volume, dry basis¹
- Measurement Technique: Gas filter correlation IR

Nitric Acid Stack Flow Transmitter

- Manufacturer : Kurz
- Model No. : K-BAR 2000B-HT
- Serial No. : 753731-00-21-57A
- Instrument No.: 467FI691
- Range : 0-500,000 pph
- Measurement Technique: Thermal Mass Meter

Section 5.1.4.1 of the Protocol suggests that “the same CEMS used during the baseline sampling period shall be used to monitor project emissions.” While Ascend Performance Materials intends to operate and maintain the above identified equipment, it may not prove practicable to use the same equipment over the entire duration of the project given potential issues, repairs, and even equipment obsolescence that may occur over a ten-year period (or even twenty-year period if a second crediting period is approved). Thus, as a pragmatic consideration, Ascend Performance Materials requests the variance to replace the CEMS equipment as needed provided that any replacement equipment is certified following the same procedures identified for the initial system certification in Section 4.1 of this monitoring plan. Furthermore, Ascend Performance Materials similarly request a variance to exercise the like-kind analyzer provisions in §75.20 of Part 75 as an option to reduce monitor downtime. Potential modifications to the CEMS will be reviewed by Ascend Performance Materials as described in Section 6.0 of this monitoring plan.

4.1 Initial system Certification and QA/QC Requirements

The initial system certification shall adhere to CAR Protocol Section 6.1.1 and Part 75 Requirements. The initial CEMS system certification includes:

N₂O CEM / Flow Meter

- 7-day Calibration Error Test
- Linearity Check
- Cycle Time
- RATA
- Bias Test
- DAHS verification test

The following sections provide an outline of the QA/QC procedures that will be incorporated into the CEMS program. CEMS maintenance history will be maintained describing work conducted on the system, including repairs and preventative maintenance. Copies of analyzer daily calibration data and CEMS audit reports (annual and quarterly- linearity, RATA, etc.) will also be kept on file at the facility.

¹ The N₂O analyzer measurements are made on dry basis but converted to a wet basis in the emission calculations based on a flue gas moisture concentration of 0.195%.

The tests and schedules for the frequency of testing for the current project are adopted from Section 2, Appendix B of Part 75 (as indicated on section 6.2.1 of the Protocol). Table below summarizes the test requirements:

Table 4-1. Test Requirements.

	Daily		Quarterly		Semi-Annually or Annually	
	467AI692	467FI691	467AI692	467FI691	467AI692	467FI691
Calibration Error Test (N ₂ O, Flow)	✓	✓				
Flow-to-load ratio				✓		
Linearity Check			✓			
RATA (N ₂ O, flow)					✓	✓

Note: Quarterly leak check and interference check do not apply to thermal mass flow meters in Nitric Acid plant stacks.

4.2 Daily CEMS Calibration Procedures

Analyzer:

A two-point (zero and span) calibration will be conducted daily on the N₂O analyzer (Instrument No. 467AI692) when the process is operating.

During each calibration, the gases will be exposed to as much of the sampling system as practical. The gases will be directed to the system manifold, up to the probe assembly, and then to the analyzer. The gases will be injected until a stable reading is obtained by the DAHS. Certified grade gases will be used for the daily calibrations.

The calibration gases for the N₂O analyzer will be:

- zero gas - 0 to 20 percent of analyzer span
- span gas - 80 to 100 percent of analyzer span

The minimum pressure for the daily calibration cylinders will be 150 pounds per square inch (psig). A calibration gas will not be used (and will be replaced) if this minimum pressure is not maintained. Following completion of the calibrations, the analyzers may be adjusted depending on the calibration results. A summary of the daily analyzer calibration check criteria and corrective action items are provided below.

Daily N₂O Analyzer Calibration Check Criteria and Corrective Actions

Calibration Result	Action Required	CEMS in-Control ^a
Less than 2.5% of the N ₂ O analyzer span	No action required	Yes

Calibration Result	Action Required	CEMS in-Control ^a
Greater than 2.5% but less than 5.0% of the N ₂ O analyzer span	Recommended analyzer adjustment	Yes
Greater than 5.0% of the N ₂ O analyzer span	Corrective action and repair	No

^aCEMS remains out-of-control until a daily analyzer calibration is successfully passed.

Flow Meter (Thermal):

In lieu of conducting a quarterly calibration error test of the flow meter as described in Section 6.2.1 of the Protocol, Ascend Performance Materials request a variance to perform a daily calibration error test following the procedures in Section 2.1.1 in Appendix B of Part 75. As indicated below, Ascend Performance Materials will make adjustments or repairs as needed to correct any calibration error test failure.

A two-point calibration will be conducted daily on the flow meter (Instrument No. 467FI691) when the analyzer is being calibrated in order to minimize loss of valid CEMS data. The flowmeter is scaled to a 4-20 mA range corresponding to 0-500,000 pph.

During each calibration, a signal is sent from the internal calibration circuitry which is part of the flowmeter equipment.

- Low signal corresponding to 10 percent of flowmeter range
- High signal corresponding to 60 percent of flowmeter range

Daily Thermal Flowmeter Calibration Check Criteria and Corrective Actions

Calibration Result	Action Required	CEMS in-Control ^a
Less than 3.0% of the flow meter range	No action required	Yes
Greater than 3.0% but less than 6.0% of the flow meter range	Recommended adjustment	Yes
Greater than 6.0% of the flow meter range	Corrective action and repair	No

^aCEMS remains out-of-control until a daily flow meter calibration is successfully passed.

CEMS data is prospectively validated for 26 clock hours (i.e., 24 hours plus a 2-hour grace period) beginning with the hour in which a daily calibration is passed. CEMS data are invalid beginning with the first hour following the expiration of this 26-hour validation period. The validation period expires if no daily check is successfully passed within the period. To better ensure quality assured data during the start of each campaign, Ascend Performance Materials requests a variance to assess the monitor performance based on calibration error tests performed either when the unit is on-line or off-line.

Routine calibration adjustments of a monitor are permitted after any successful daily calibration. These routine adjustments shall be made to bring the analyzer and flow readings as close as practical to the calibration gas values or flow signal values. An additional complete (zero and span) calibration check is required following routine analyzer adjustments.

The CEMS automatically records the results of daily calibration checks. If the error is less than 2.5% (for N₂O analyzers) or 3% (for the thermal mass flow meter) no action is required. . If the error is between 2.5% and 5% (N₂O analyzers) or 3% and 6% (thermal mass flow meter) Ascend may make adjustments to reduce the calibration error. If the error is greater than 5% (N₂O analyzer) or 6% (thermal mass flow meter) a re-calibration occurs immediately. If the recalibration fails, the system sends a maintenance alarm to operations and does not record concentration or flow until there is a successful calibration.

In lieu of performing an annual evaluation of the span and range as specified under Section 2.1.1.5 in Appendix A of Part 75, Ascend Performance Materials requests a variance to select the analyzer span and range values based on a review of the data from the first campaign after the installation of the secondary catalyst.

4.3 Quarterly Analyzer and Flow Checks

Quarterly Linearity Checks (LC)

Linearity checks (LC) will be conducted on the N₂O analyzer (Instrument No. 467AI692) once every QA operating quarter, as defined under Part 75, in calendar quarters that have not had a RATA performed. The LC will be conducted while the process is on-line. The LCs will be conducted in accordance with procedures outlined in Part 75, Appendix A, Section 6.2 using Certified Grade audit gases. Note that certified gases will be used because USEPA Protocol 1 grade N₂O gases are currently not available.

Three audit gases will be used for the N₂O LC.

- 20 to 30 percent of analyzer span
- 50 to 60 percent of span
- 80 to 100 percent of span

During the LC, the analyzers will be challenged three times with each audit gas (non-successively) and the average of the analyzer responses used to evaluate LC results. The audit gases will be directed up to the sample probe and back to the analyzer, being exposed to as much of the sampling system as possible. The gases will be injected for a period long enough to ensure that a stable reading is obtained from the DAHS.

The LCs will be conducted by facility personnel. The LC is to be conducted “hands off”, or without any adjustments, maintenance, or corrective actions conducted on the CEMS during the LC. However, routine and non-routine calibration adjustments can be conducted at any of the three audit points prior to the LC. No other corrective actions, repairs, re-linearization, or reprogramming are allowed prior to the LC. If these activities are required to be conducted prior to a LC, the analyzer is required to be classified as out of control from the hour in which the repairs are commenced until the hour a LC has been successfully completed. In addition, trial gas injections may be made prior to the LC, as

necessary. These injections do not need to be reported if the results are within the above specified criteria. If the results are not within criteria, the trial injection must be treated as an aborted LC.

LC Criteria

LC results: For N₂O concentration monitors, or monitoring system certification, recertification or diagnostic testing results- are **acceptable** if the error in linearity for each calibration gas concentration ≥ 100 ppm (zero low-, mid-, and high-levels) does not exceed or deviate from the reference value by more than **5.0 percent**. Alternate acceptance criteria for testing results are acceptable if the error in linearity for each calibration gas concentration ≤ 100 ppm (zero low-, mid-, or high-levels) does not exceed or deviate from the reference value by more than 5 ppm or when a linearity test is aborted due to a problem with the monitor or monitoring system. If the results of the LC are not within this criterion, the CEMS will be classified as out of control and corrective action taken. Once the problem is identified and corrected, another LC will be performed. CEMS data is considered invalid beginning with the first hour following a failed LC. Data is once again valid beginning with the first hour following a successfully passed LC. The analyzer data will also be considered out of control if a LC was not completed during the quarter in which it was due and the grace period defined in Section 2.2.4 in Appendix B of Part 75 has been exceeded.

The information will be stored in electronic records for 10 years from the date of generation or a minimum of 7 years from the date of the last verification.

Flow to Load Ratio

The Ascend Performance Materials Nitric Acid plant generates 650 psig and 175 psig steam for internal plant use only and the Flow-to-Load ratio will be evaluated each calendar quarter following procedures in Appendix B to 40 CFR PART 75 section 2.2.5. The Boiler Feed Water flow meters 467FC392 and 467FC402 are used as surrogates for the amount of steam generated since metering for only the generated steam amounts are not available.

The results of a quarterly flow-to-load evaluation are acceptable, and no further action is required, if the calculated value of E_f is less than or equal to 20.0 percent, if L_{avg} for the most recent normal-load flow RATA is <60 megawatts (or <500 klb/hr of steam) and if unadjusted flow rates were used in the calculations.

4.4 Annual CEMS Relative Accuracy Test Audit (RATA) Procedures

Ascend Performance Materials will conduct RATAs consistent with the requirements in Appendix A of 40 CFR Part 75. Annual RATAs will be conducted if the RA meets the 7.5% requirement as specified in Appendix A of 40 CFR Part 75, Section 3.3. If the RA is greater than 7.5%, Ascend Performance Materials will conduct semi-annual RATAs. “Semiannual” means once every two QA operating quarters and “annual” means once every four QA operating quarters as defined in Part 75.

Test Plan

A certification protocol will be submitted by the RATA contractor for Ascend approval prior to each CEMS certification. This protocol will be structured to ensure that the resultant RATA report will include, at a minimum, the following information.

- Process and CEMS description
- Stack and process schematics
- Process operating conditions during testing
- Sampling test methods
- Test equipment QA/QC procedures
- Example calculations
- Field test schedule

The test methods to be used during the RATA include:

- USEPA Method 1: Sample and Velocity Traverses for Stationary Sources
- USEPA Method 2: Determination of Stack Gas Velocity and Volumetric Flow Rate
- USEPA Method 3A: Oxygen and Carbon Dioxide Analysis (Instrument Analyzer Procedure)
- USEPA Method 4: Determination of Moisture Content in Stack Gases
- USEPA Method 320: Determination of Gaseous Compounds by Extractive Direct Interface Fourier Transform Infrared (FTIR) Spectroscopy
- ISO/DIS 21258 stationary source emissions determination of the mass concentration of N₂O reference method for NDIR
- Other NDIR methods or performance specification-based reference method such as EPA method 7E

General RATA Procedures and RA criteria

Each RATA will consist of nine (9) to twelve (12) 21-minute test runs during which the stack outlet N₂O CEMS will be certified on a volumetric parts-per-million drybasis (ppm_{v,dry}). The flow rate monitoring system (FRMS) will be certified in units of wet standard cubic meters per hour (wet scm/hr). The duration of all gas concentration RATA runs shall be a minimum of 21 minutes in accordance with Section 6.1.3 of the Protocol. However, Ascend Performance Materials requests a variance to that the minimum flow monitor RATA run time shall be five minutes consistent with the requirements of Section 6.5.7(a) of Appendix A of Part 75. Note that the RATA contractor will conform to the accreditation requirements outlined in ASTM D7036-04.

Given the typical consistent operation of the nitric acid plant, Ascend Performance Material requests a variance from the procedures used to determine normal RATA load levels under Section 2.3.1.3 in Appendix A of Part 75, which were designed to address fossil-fuel power plants that may operate at different load conditions, and instead proposes to conduct each RATA a single normal load. During the RATAs, the process will operate at a normal load point which is greater than 50 percent of rated capacity. The RATA will be conducted at a single process set point.

The following are the RATA criteria for each certified unit.

N ₂ O, ppmv -	7.5 percent based on the reference method for annual certification or 10 percent of the reference method for semiannual certification. RA not to exceed ± 15.0 ppm, per guidelines of 40 CFR 75, Sec 3.3.7 for low emitters, where N ₂ O < 250 ppm.
Volumetric flow, wet scm/hr -	7.5 percent based on the reference method for annual certification or 10 percent of the reference method for semiannual certification.

The data will be considered out of control if the above criteria are not met until the CEMS can successfully meet the criteria. The CEMS will also be considered out-of-control if the RATA was not completed during the quarter in which it was due and the grace period defined in Section 2.3.3 in Appendix B of Part 75 has been exceeded.

Bias Test

Following completion of the CEMS RATA, the RATA contractor will conduct a bias test on the N₂O and flow monitoring systems in accordance with procedures outlined in 40 CFR Part 75, Appendix A, Section 7.6. If the mean difference between the reference method and facility data sets is greater than the absolute value of the confidence coefficient the monitoring system has failed the bias test and a bias adjustment factor (BAF) will be applied to N₂O mass emission rate data (ppm_{vd}) and volumetric flow data (wet scm/hr). This BAF will be used beginning with the first hour following the completion of the RATA and continuing until another bias test is conducted. Results of the bias test may also be included in the final RATA test report.

RATA Test Methods

CEMS certification testing will be conducted in accordance with procedures outlined in 40 CFR Part 75, Section 6.5 of Appendix A. N₂O concentrations will be measured in accordance with any of the following test methods in accordance with USEPA Reference Method (RM) 7E certification and sampling procedures:

- USEPA RM 320
- ASTM D6348-03
- ISO/DIS 21258
- AM0034 or AM0028

Non-dispersive infrared (NDIR) or FTIR on-site instrumentation will be used to conduct the certification, depending on the test method selected. Volumetric flow rates will be measured in accordance with USEPA RMs 1 through 3A.

5 Initial Certification Activities

The Climate Action Reserve requires four additional audit activities to be conducted during the initial CEMS certification conducted under the CAR monitoring program. These activities include:

- 7-day drift check on the N₂O analyzer and flowmeter
- Cycle time check
- DAHS verification test

Details of each of these tests are discussed individually below. Results of these tests will be included in the final RATA test report. No notifications or certification applications will be prepared or submitted as part of this initial certification process.

5.1 7-Day CEMS Drift Check

The 7-day drift check is a series of seven consecutive daily flowmeter and N₂O analyzer calibration error checks that are evaluated with respect to specified criteria. This test will be conducted in accordance with procedures outlined in 40 CFR Part 75, Appendix A, Section 6.3 while the process is operating. Each calibration will be conducted approximately 24 hours apart following the same procedures used to conduct typical daily calibration tests. No adjustments will be made to the analyzer nor flowmeter prior to the calibration; however routine analyzer adjustments may be conducted following completion of the check.² Results used for the 7-day drift check will be obtained prior to any adjustments. Each of the seven calibration error tests must be within **2.5 percent** of analyzer span and within **3.0 percent** of flowmeter span.

5.2 CEMS Cycle Time Check

The CEMS cycle time check measures the time required for a CEMS to respond to a specified pollutant concentration. The zero and high calibration gases are used for this test while the unit is operating in accordance with procedures outlined in 40 CFR Part 75, Appendix A, Section 6.4. Both downscale and upscale tests are conducted with the slowest response used for the overall cycle time test result. Both upscale and downscale cycle time results must be less than **15 minutes**. Results of the cycle time testing will be included in the final RATA test report.

5.3 DAHS Verification

Testing will be conducted on the DAHS to verify that hourly averages for pollutant concentrations and mass emission rates (tCO₂e/hr) are accurately calculated. In addition, proper computation and application of missing data substitution procedures outlined in 40 CFR Part 75, Subpart D and bias adjustment factors in Part 75, Appendix A, Section 7 will also be demonstrated. DAHS verification documentation may be included in the final test report or be a separate report.

CEMS Recordkeeping and Reporting

The following sections provide descriptions of the CEMS emissions data handling, recordkeeping, and reporting procedures.

² The auto calibration feature must be disabled for this test.

5.4 Data Substitution Requirements

The CEMS DAHS will substitute N₂O emissions data (hourly averages) for periods in which there is no valid data reported by the CEMS. Missing data will be substituted in accordance with procedures outlined in 40 CFR § 75.33(c).

The substituted data used depends on the percentile of valid data available. The two CEMS units that require data substitution are the N₂O concentration and volumetric flow rate. The following tables outline the various data substitution scenarios for non-load-based units.

Table 5-1 Volumetric Flow Rate Missing Data Substitution Routines (467FI691)

Data Availability	Duration of CEMS Outage ^a	Calculation Method	Lookback Period (hours) ^b
Greater than 95 %	Less than 24 hours	Average	2160
	Greater than 24 hours	Greater of the 90 th percentile or average HB/HA	2160
Greater than 90%, but less than 95%	Less than 8 hours	Average	2160
	Greater than 8 hours	Greater of the 95 th percentile or average HB/HA	2160
Greater than 80%, but less than 90%	Any hour	Maximum value ^c	2160
Below 80%	Any hour	Maximum potential flow rate ^d	NA

^a During unit operation only.

^b Lookback period consists of quality-assured (in-control) CEMS operating hours only.

^c Maximum value is the highest CEMS flow rate reading observed during the lookback period (minimum is required during baseline if < 2160 hours of quality-assured (in-control) CEMS operating hours)

^d The maximum potential volumetric flow rate is established for use in the worst-case scenario outlined above when the CEMS historical data availability falls below 80 percent. Defined as the highest hourly average measured (during normal process operating conditions corresponding to the maximum stack gas flow rates) by a certified CEMS during the previous 2160 hours. It must be demonstrated that the control system was in operation during the missing data period. Note: Above table assumes 2160 hours have been achieved. The Maximum Potential Flow Rate will be reviewed annually to determine if revisions are required. (Minimum is required during baseline if < 2160 hours of quality-assured (in-control) CEMS operating hours)

Table 5-2 CEMS N₂O Concentration Missing Data Substitution Routines (467AI692)

CEMS Data Availability	Duration of CEMS Outage ^a	Calculation Method	Lookback Period (hours) ^b
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CEMS Data Availability	Duration of CEMS Outage ^a	Calculation Method	Lookback Period (hours) ^b
Greater than 95 %	Less than 24 hours	Average	2160
	Greater than 24 hours	90 th percentile	2160
Greater than 90%, but less than 95%	Less than 8 hours	Average	2160
	Greater than 8 hours	95 th percentile	2160
Greater than 80%, but less than 90%	Any hour	Maximum value ^c	2160
Below 80%	Any hour	Maximum Expected N ₂ O Concentration	720

^a During unit operation only.

^b Lookback period consists of quality-assured (in-control) CEMS operating hours only.

^c Maximum value is the highest CEMS reading observed in the lookback period. (Minimum is required during baseline if < 2160 hours of quality-assured (in-control) CEMS operating hours)

^d The maximum potential N₂O emission rate is established for use in the worst-case scenario outlined above when the CEMS historical data availability falls below 80 percent. Missing data procedures can utilize Maximum Expected Concentration (MEC), in lieu of maximum potential concentration (MPC), for units with add-on control devices if parametric monitoring confirms that the add on control device is operating within normal operating ranges. MEC is defined as the highest hourly average measured (during normal operation) by a certified CEMS during the previous 720 hours. It must be demonstrated that the control system was in operation during the missing data period. The MEC will be reviewed annually to determine if revisions are required. (minimum is required during baseline if < 2160 hours of quality-assured (in-control) CEMS operating hours)

5.5 CEMS File Storage Requirements

The following CEMS reports will be stored in electronic records for 10 years from the date of generation or a minimum of 7 years from the date of the last verification.

- CEMS certification reports
- CEMS quarterly linearity check results
- N₂O analyzer calibration results
- CEMS semiannual reports (if necessary, for RATA)

6 CEMS Modification and Change Procedures

Overview

In order to ensure that CEMS performance and data reporting percentages remain within specified criteria, significant changes or modifications to CEMS components (other than like-kind replacement parts), data acquisition systems, calibration procedures, or other operational procedures will be reviewed prior to changes being made. These modifications are typically the result of system component or software upgrades, replacement of CEMS components due to system degradation or malfunction, or technical improvements to the system. CEMS operational and maintenance procedural changes may be in response to changes in permit requirements, regulatory agency guidelines, or requirements of newly installed instrumentation.

CEMS Modifications

CEMS modifications will be assessed with respect to regulatory requirements and manufacturer's specifications to assure that the accuracy of reported CEMS data will not be affected by the modification. Personnel will review the proposed modification to identify whether subsequent audit procedures are warranted as a result of the modification. When a CEMS modification is contemplated, the Project Developer will also review the proposed changes to ensure that they adhere to CAR Nitric Acid Production Protocol V2.2 requirements and USEPA Part 75. A summary of the CEMS modification will be prepared and will include:

- CEMS impacted by the change
- reason for the modification
- description of the change
- potential performance impacts
- proposed implementation schedule
- subsequent QA/QC procedures to be conducted (if any)

7 Process Diagram

