Engineers and Soil Scientists

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Phlogiston Phase I

CAR 1480

Facility Owner	Ascend Performance Materials Operations LLC
Project Developer & Owner	Ascend Performance Materials Operations LLC
Technical consultant	ClimeCo LLC
Registry	Climate Action Reserve (CAR)
Protocol	U.S. Adipic Acid Production Protocol (v1.0 September 30, 2020)
Reporting Period	7/1/2024 – 12/31/2024
Report Date	2/26/2025
Verification Team	Travis Sexton, Lead Verifier
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1. Introduction/Summary

1.1 Objective and Introduction

The objective of this engagement is the verification of the Phlogiston Phase I Project (Phlogiston) against the CAR U.S. Adipic Acid Production Protocol v1.0 (Protocol) and the Errata and Clarifications dated 7/27/2021 for the purpose of registration with the Climate Action Reserve. AWT assessed the integrity of the asserted offsets to a reasonable level of assurance.

The purpose of this verification report is to provide a third-party evaluation of the greenhouse gas offset credits that were asserted by Ascend Performance Materials Operations LLC (Ascend) and ClimeCo LLC. (ClimeCo) for an Adipic Acid Production project located near Cantonment, FL. The reporting period for this verification is July 1, 2024 through December 31, 2024. The project abates GHG emissions from an adipic acid plant by enhancing the existing control technology. The enhanced control technology serves to destroy N_2O emissions that would otherwise have been vented to the atmosphere.

1.2 Verification Scope

The verification scope is an up-front specification that indicates the type of verification to be undertaken including types of GHGs and reporting period, baseline scenario, GHG project description (physical infrastructure, activities, technologies, and processes), and GHG sources, sinks and reservoirs.

1.2.1 Baseline Scenario

The baseline scenario for this project is the production and venting of N_2O off gas from the adipic acid production process. The off gas would be sent through the NO_x-specific selective catalytic reduction (SCR) technology instead of the N_2O-specific control unit (Thermal Reduction Unit or TRU). The baseline emissions are quantified based on Section 5.1.1 of the Protocol using the static baseline approach. See Section 3.1.4 for additional information.

1.2.2 Physical Infrastructure

Based on the documentation provided as well as the information obtained from the site audit, the following items make up the physical infrastructure of the system:

- Equipment used in production of adipic acid with N_2O as an off gas
- Equipment used in recovery of nitric acid (absorber column)
- Equipment used to destroy N_2O gas (Thermal Reduction Units)
- Monitoring equipment used for quality control

1.2.3 Types of Greenhouse Gases

For this verification, Carbon Dioxide (CO_2), Methane (CH_4), and Nitrous Oxide (N_2O) are the only greenhouse gases considered.

1.2.4 Crediting and Reporting Period

Annual verification is required by the Protocol, however the project developer has opted to do a semi-annual verification. The reporting period for this verification is July 1, 2024 through December 31, 2024. This reporting period is entirely in the first 10-year crediting period (January 20, 2021 through January 19, 2031) in which the project is eligible to receive credits (CRTs).

1.2.5 Project Boundaries and GHG Sources, Sinks and Reservoirs

Upon review of the documentation provided by the project developer and through the site audit conducted, the project encompasses the following project boundaries:

1. Source (B, P) – Emissions from adipic acid production process unit.
3. Source (B, P) – Emissions from hydrocarbon used for reducing agent, for reheating off gas, or for combustion fuel for thermal reduction units.
5. Source (B, P) – Emissions from increased external energy use.

Sinks: None
Reservoirs: None

These sources, sinks, and reservoirs are appropriately included as compared to the requirements of the Protocol.

1.3 Verification Criteria

This verification is consistent with the following:

- ISO 14064-3:2019 standard, ISO 14066, ISO 14065, IAF MD6 and ANAB requirements, policies and procedures.
- Climate Action Reserve's U.S. Adipic Acid Production Protocol (Version 1.0) and the Errata and Clarifications to the Protocol dated July 27, 2021
- Reserve Offset Program Manual (April 2024)
- Verification Program Manual (February 2021)

Due to the asserted number of CRTs generated from this project (greater than 100,000 tCO_2e/year), the quantitative materiality threshold is set at 1%. This agrees with the guidelines established by the Climate Action Reserve.

1.4 Project Description

The Phlogiston Phase I project is a N_2O abatement operation located at Ascend Performance Materials Operation LLC's (Ascend) adipic acid plant in Cantonment, FL. The project consists of the installation and operation of a new NO_x absorption column to enhance the plant's existing control technology. The absorption column regulates NO_x emissions so that a greater portion of the N_2O off gas can be directed to the Thermal Reduction Unit (TRU) instead of non-N_2O control units. This results in more N_2O being destroyed as an emissions reduction benefit. In May 2023, a second TRU was added to further facilitate N_2O abatement.

1.5 Level of Assurance

This is a reasonable assurance engagement meaning that AWT will provide a reasonable, but not absolute, level of assurance that the GHG offset assertion is materially correct.

2. Verification Methodology

2.1 Approach

Agri-Waste Technology, Inc. (AWT) follows a consistent methodology for all Climate Action Reserve's Adipic Acid Production verifications.

1. Participant selects verifier. V/V director performs pre-engagement review and assigns team leader based on sector and documents these activities in the internal project description document. The contract can be drafted at this point but cannot be fully executed until the COI evaluation has been approved by CAR. Team leader sends contract to client for signature.

2. Team leader forms verification team as well as negotiates and executes subcontractor agreements (if applicable).

3. Team Leader and COI Auditor prepare Internal Conflict of Interest and Impartiality documents and obtain signatures from all team members. The Team Leader or Team Member under the direction of the Team Leader prepares NOVA/COI form and submits it to the COI Auditor for completion. COI Auditor determines if there are issues with COI and completes NOVA/COI form. Team leader reviews the NOVA/COI form, signs the form and submits it to CAR at a minimum of ten business days prior to beginning any verification services (submit updated COI form every year).

4. After receipt of approval from CAR to proceed with the project, the Team Leader executes the contract. It should be noted that steps 4-8 are all occurring somewhat simultaneously. The specific order of completion is not important.

5. Team leader reviews preliminary documentation and any results of previous assessments (if applicable) from aggregator or project owner and discuss goals and constraints. This review includes determining the following:
    - Nature, scale, and complexity of the verification activity to be undertaken on the client's behalf
    - Confidence in the responsible party's GHG information and assertion
    - Completeness of the responsible party's GHG information and assertion and the eligibility of the responsible party to participate in the GHG program

    As part of the initial review of the project documentation, the Team Leader or Team Member under the direction of the Team Leader performs the Strategic Analysis.

    Previous Assessments--If a previous verification has been completed for the client, then AWT would request a copy of the report to review it and make sure that all relevant information is addressed appropriately. Reviewing these reports helps to eliminate any duplicate site/desk audits and includes a review of the conclusion, so that it can be carried forward to the current report appropriately.

6. Team Leader assesses or supervises the assessment of the controls for sources of potential errors, omissions, and misrepresentations, while taking the following into account:
    - Selection and management of the GHG data and information
    - Risk of a material discrepancy occurring
    - Processes for collecting, processing, consolidating, and reporting GHG data and information
    - Risk that the controls of the organization or GHG project will not prevent or detect a material discrepancy
    - Risk that the verifier will not detect any material discrepancy that has not been corrected by the controls of the organization or GHG project

    As part of the assessment of controls, the Team Leader or Team Member under the direction of the Team Leader completes the Risk Assessment.

7. Team leader prepares or supervises the preparation of the evidence gathering plan.

8. Team leader prepares or supervises the preparation of the verification plan.

9. Team leader holds a kick-off meeting with participants, which includes:
    - Introduction of the verification team
    - Review and confirmation of verification process and scope, objectives, level of assurance, criteria, and materiality
    - Transfer of background information, underlying activity data and results of previous assessments (if applicable)
    - Review and confirmation of the verification process and schedule

10. Conduct verification activities in accordance with the General Verification Protocol.
    - Identify emissions sources
    - Review methodologies and management systems
    - Review project documentation for completeness
    - Schedule and perform site visit/field audit (if required)
    - Complete desk audit and compile site visit information
    - Verify emission estimates
    - Amend evidence gathering plan if any new risks or material concerns that could potentially lead to errors, omissions and misrepresentations are identified.

11. Team leader prepares or supervises the preparation of the list of findings and submits to client.

12. Team leader prepares or supervises the preparation of the verification statement and verification report. The verification statement is a brief, one-page summary that confirms the verification activities and outcomes. The verification report includes the following elements:

    a. The scope of the verification process
    b. The standard used to verify emissions
    c. A description of the verification activities based on size and complexity of the participant's operations
    d. A list of diversions from the original evidence gathering plan
    e. A list of the emissions sources identified

f. A description of the sampling techniques and risk assessment methodologies employed for each source
g. An evaluation of the participant's emissions report compliance with the protocol
h. A comparison of the participant's overall emission estimates with the verifier's overall emission estimates
i. A list of material discrepancies if any
j. A list of immaterial discrepancies if any
k. A general conclusion to be reflected in the Verification Statement forwarded to CAR

13. Internal Peer Reviewer reviews the verification report, verification statement and accompanying documents to confirm that all verification activities have been completed, whether the GHG assertion is free of material discrepancy and whether the verification activities provide the agreed upon level of assurance. The *Internal Project Technical Review* is utilized to document the internal review. The internal peer reviewer signs the *Internal Project Technical Review* form, the verification report, and the verification statement.

14. Exit meeting is scheduled, so that the Team leader and participant can discuss the verification report and statement (*participant has up to 30 days to review and to make comments*)

15. Upon approval, team leader uploads the list of findings, verification report and verification statement to CAR.

16. CAR then completes the reporting process

17. Recordkeeping--AWT will keep participants hard and electronic copies for a minimum of seven years to include the following:

- Participant's GHG emissions report
- Verification report
- Verification statement
- Contact information for the lead verifier and a responsible corporate officer at the participants organization
- General description of the participant's organization
- Geographic boundaries
- Number of facilities and operations assessed in the verification activities
- GHGs evaluated
- Sources of emissions identified
- Assessment of emission factors, demonstrating greater accuracy if not default emission factors
- Copies of fuel use, mileage or other activity data records used in sample recalculations
- Verification methodology used based on the size and complexity of the participant
- Sampling procedures for selecting site visits
- Dates of site visits
- Verifier's evaluation of the participants management systems
- Verifier's estimates of the participants' emissions

2.2 Potential Errors, Omissions and Misrepresentations

AWT assesses risks of potential errors, omissions or misrepresentations and reports relative magnitudes in this section. The risks are utilized to develop the Evidence Gathering Plan. The following Table shows the identified risk categories:

Table 1: Risk Assessment Matrix

SSR	Source	Baseline or Project	Gas	Type of Risk	Relative Magnitude to ER assertion	Notes
1	Adipic acid production process unit (burner inlet to stack)	B, P	N_2O	Inherent Controlled Detectable	High High High	This is calculated via the protocol defined equations, defaults, and adipic acid production records.
3	Hydrocarbon used as reducing agent, for reheating the off gas, or for combustion fuel for thermal reduction units	B, P	CO_2 CH_4	Inherent Controlled Detectable	Low Low Low	This is calculated via the protocol defined equations, defaults, and fossil fuel usage records.
5	Emissions form increased external energy use	B, P	CO_2 CH_4 N_2O	Inherent Controlled Detectable	Low Low Low	This is calculated via the protocol defined equations, defaults, and fossil fuel usage records.

2.3 Amount and type of evidence (qualitative and quantitative) necessary to achieve the agreed level of assurance

AWT examined the GHG data and information to develop an accurate account of the project's GHG assertion. AWT determined whether the project conformed to the verification criteria and any discrepancies were addressed by the client or responsible party. AWT examined whether the verification evidence collected supported the GHG assertion, by evaluating the collected evidence in the assessments of controls, GHG data and information, and applicable GHG program criteria to support the GHG assertion. AWT determined whether the GHG assertion is without material discrepancies and AWT provided the level of assurance agreed upon in the original contract. Any modifications to the GHG assertion were evaluated, so that all evidence supports its findings. Specific data/information provided by the client or responsible party included but were not limited to:

- Description of the procedures and systems used to collect, document and process GHG emissions data at the facility level
- Description of quality control procedures applied (internal audits, comparison with last year's data, recalculation by a second person, etc.)
- Listing of responsible individuals for collecting GHG emissions data at each site and at the corporate level, if applicable
- Information on uncertainties, qualitative and if available, quantitative

AWT reviewed the information and data according to the following:

Table 2: GHG Source and Sinks

GHG Source	SSR	Gas	Baseline or Project	Methods to Conduct Data/Document Checks	Summary of Information Analyzed
Adipic acid production process unit (burner inlet to stack)	1	N_2O	B, P	Review estimations and data provided by the project developer and compare them to the protocol requirements	1. Adipic acid production records 2. CEMS data 3. Baseline and Project Emissions Aggregation 4. Project Summary 5. Protocol Defaults 6. Emission Reduction Calculator
Hydrocarbon used as reducing agent, for reheating the off gas, or for combustion fuel for thermal reduction units	3	CO_2 CH_4	B, P	Review estimations and data provided by the project developer and compare them to the protocol requirements	1. Historic and current hydrocarbon flow data to TRUs 2. Baseline and Project Emissions Aggregation 3. Project Summary 4. Protocol Defaults 5. Emission Reductions Calculator
Emissions from increased external energy use	5	CO_2 CH_4 N_2O	B, P	Review estimations and data provided by the project developer and compare them to the protocol requirements	1. Historic and current hydrocarbon flow data to TRUs 2. Historic and current off gas utilization and heating records 3. Electricity usage estimates 4. Baseline and Project Emissions Aggregation 5. Project Summary 6. Protocol Defaults 7. Emission Reductions Calculator

2.4 Implementation of Evidence Gathering Plan

AWT incorporated the following strategy in the implementation of this Evidence Gathering Plan:

An Evidence Gathering Plan was developed to ensure that all data used in the verification was appropriately checked for potential errors, omissions, or misrepresentations. The following provides a summary of the pertinent items of the Evidence Gathering Plan as well as a description of how the plan was implemented during this verification.

1. **Adipic Acid Production Records –** 100% of the data was reviewed and cross referenced with N_2O gas flow records to ensure mass balances are consistent.
2. **N_2O Gas Flow to Abatement Devices** – 100% of the data was sampled and checked in terms of the aggregation of nitrous oxide gas flow to the abatement devices (Thermal Reduction Units)
3. **N_2O Gas Concentration prior to Abatement Devices** - 100% of the data was sampled and checked in terms of the aggregation of nitrous oxide gas flow to the abatement devices (Thermal Reduction Units).
4. **Operating Hours** – 100% of the data was sampled and checked to ensure it was consistent and reasonable.
5. **Baseline Look-back** – the baseline look-back documentation and calculations were reviewed to ensure they were consistent and reasonable.
6. **External Energy Emissions –** 100% of the records for baseline and project use of external energy (steam, off gas utilization and heating, electricity, and fossil fuels) were checked to ensure they were consistent and reasonable.
7. **Default Variables –** The default variables were reviewed to ensure that they adequately reflect what is described in the protocol.
8. **Emission Reductions Calculation** – This calculation was 100% reviewed and a separate recalculation was made by the verification team using the aggregated flow, gas concentration, and historical records.
9. **Review of Monitoring and QA/QC Requirements** – the records for calibration error testing, interference checks, flow-to-load ratio, leak checks, linearity checks, and relative accuracy test audits (RATA) were reviewed and compared to protocol requirements.
10. **Review of the compliance, permitting information, and emission reduction ownership** – 100% of this documentation was reviewed.
11. **Review Data Checking Mechanisms –** The operating effectiveness of the controls and project developer's data checking process were reviewed, to ensure low risk of control errors.
12. **Crosscheck of Data Aggregation for Data Substitution** – The data aggregations and emission reduction calculations are crosschecked against the raw data files to identify any instances of data substitution. These instances are included in the verification report, if applicable.
13. **Regulatory Compliance** – the regulatory compliance history of the project is reviewed to ensure the project is in compliance with its Title V permit and other applicable regulations. Any identified violations during the reporting period are included in the verification.

2.5 Diversions from the Original Evidence Gathering Plan

No revisions were required for the original evidence gathering plan.

3. Verification Findings

3.1 Project Description and Findings

The Phlogiston Phase I project is a N_2O abatement operation located at Ascend Performance Materials Operation LLC's (Ascend) adipic acid plant in Cantonment, FL. The project consists of the installation and operation of a new NO_x absorption column to enhance the plant's existing control technology. The absorption column regulates NO_x emissions so that a greater portion of the N_2O off gas can be directed to the Thermal Reduction Units (TRU1 and TRU2) instead of the non-N_2O control units. This results in greater N_2O destruction as an emissions reduction benefit. Initially, there was only one TRU in service at the facility; a second TRU was installed in May 2023 for redundancy and to ensure consistent destruction of N_2O off gas.

The N_2O off gas flow rate and concentration is monitored continuously using a continuous emissions monitoring system (CEMS). The project's data acquisition and handling system (DAHS) is responsible for CEMS data monitoring, performing adjustments such data substitution, and recordkeeping. The equipment is set up to monitor the Observations of the CEMS and recordkeeping practices were made during AWT's previous site audit.

AWT's review of the GHG management system took place during the previous verification's site visit through observations of onsite procedures and interviews with project personnel. The reviews included confirming that the project monitoring was done by direct measurements from the CEMS for five different gas flow rates (TRU 1 inlet, SCR inlet, TRU 2 inlet, TRU 1 outlet, and TRU 2 outlet) and three different N_2O concentrations (Upstream of all inlets, TRU 1 outlet, and TRU 2 outlet).

The following table lists the project monitoring equipment in use for the reporting period. Location and functionality of the monitoring equipment was confirmed during the site visit. CEMS data is automatically recorded by the datalogger and stored electronically. AWT verified that the data management and recordkeeping systems meet the requirements of the Protocol.

Table 3: Project Monitoring Equipment

Monitoring Equipment	Serial Number	Monitored Data Point
Rosemount 3051S Flow Meter	0065970	Off gas flow (TRU 1 inlet)
Rosemount 3051S Flow Meter	22SHPE0158676	Off gas flow (TRU 2 inlet)
Rosemount 3051S Flow Meter	0065971	Off gas flow (SCR inlet)
Kurz K-BAR 2000B-HT Flow Meter	10144	Off gas flow (TRU 1 outlet)
Kurz K-BAR 2000B-HT Flow Meter	10374	Off gas flow (TRU 2 outlet)
ABB 3502 Multiwave Gas Analyzer	H005387002	N_2O concentration (TRU 1, TRU 2, and SCR inlets)
Thermo Fisher Scientific EM-46i-ALNPCA Gas Analyzer	1192914959	N_2O concentration (TRU 1 outlet)
Thermo Fisher Scientific EM-46i-ALNPCA Gas Analyzer	12217818225	N_2O concentration (TRU 2 outlet)

3.1.1 Variances

The project was granted three variances that impacted the project during initial certification and/or the reporting period. A summary of each variance follows accordingly:

1. A variance dated 5/19/2021 grants allowance for permanent use of the Rosemount Smart Transmitter system to satisfy the Protocol's testing frequency of calibration error tests, interference tests, leak checks, and linearity checks for TRU 1 monitoring equipment under the following conditions:
    a. The verifier confirms that the diagnostics gathered by the Smart Transmitter sufficiently indicate calibration issues, blockages in tubing connecting the flow element and transmitter, flow leakage from the instrument, and any other relevant issues with the flow meters.
    b. The verifier confirms that appropriate measures are taken when/if the Smart Transmitter indicates material issues with the flow meters, such as an out-of-calibration event.
    c. The verifier confirms that manufacturer-recommended maintenance and calibration are performed for the Smart Transmitter.
    d. The verifier confirms that all other protocol QA/QC requirements are met.
    e. The variance is limited to the project's crediting period or until such time that the project discontinues operation or use of the Smart Transmitter.

2. A variance dated 10/5/2021 grants allowance for the Reserve to accept the initial certification requirements performed as late as one month after the project start date, rather than in advance of the 1/20/2021 start date under the following conditions:
    a. The verifier confirms the 7-day calibration error tests, cycle time tests, and linearity checks were conducted on the dates claimed in the variance request.
    b. The verifier confirms the RATAs and bias tests for the inlet and outlet CEMS were conducted and passed in advance of the project start date.
    c. The verifier confirms the CEMS installation and certification met the other requirements per the protocol and 40 CFR.

3. A variance dated 12/26/2023 grants allowance for permanent use of the Rosemount Smart Transmitter system to satisfy the Protocol's testing frequency of calibration error tests, interference tests, leak checks, and linearity checks for TRU 2 monitoring equipment so long as it follows the conditions outlined in the 5/16/2021 variance. Additionally, the variance grants allowance for the new Smart Transmitter to adhere to the requirements of CFR Part 75 in lieu of the below condition:
    a. The verifier confirms that the diagnostics gathered by the Smart Transmitter sufficiently indicate calibration issues, blockages in tubing connecting the flow element and transmitter, flow leakage from the instrument, and any other relevant issues with the flow meters.

CFR Part 75 allows for a 180-day window between the first hour of operation and the completion of the initial certification requirements. As part of the variance, the following is required:

a. The verifier confirms the initial certification for the Smart Transmitter for the TRU was completed within 180 days after the first hour of operation.
b. The variance is limited to the 4/1/2023 – 9/30/2023 reporting period.

The project met the initial requirements of each variance and continues to fulfill each ongoing requirement established by the variances.

3.1.2 CEMS Certification

Section 6.1 of the Protocol outlines the requirements for CEMS installation and certification. The facility is managed by appropriately trained staff members. ClimeCo employees have received proper training to ensure they are aware of the process management protocols as well as the data management protocols. The following tables detail how each requirement was met for the CEMS installation and certification process:

Table 4: 7-Day Calibration Error Tests for Flow Meters and Gas Analyzers

Abatement Equipment	Monitoring Equipment	Serial Number	Testing Date(s)	Test Results
TRU 1	Rosemount	0065970	2/16/2021 – 2/22/2021*	Passed**
	Rosemount	0065971	2/16/2021 – 2/22/2021*	Passed
	Kurz	10144	11/8/2020 – 11/14/2020	Passed
	ABB	H005387002	1/15/2021 – 1/21/2021*	Passed
	Thermo Fisher Scientific	1192914959	11/8/2020 – 11/14/2020	Passed
TRU 2	Rosemount	22SHPE0158676	5/31/2023 – 6/6/2023	Passed
	Kurz	10374	7/22/2023 – 7/28/2023	Passed
	Thermo Fisher Scientific	12217818225	7/22/2023 – 7/28/2023	Passed

*The tests were performed late one month after the project start date. The Reserve granted a variance to allow the late testing results.

**Passed results indicate that the observed calibration errors were within the allowable range defined in sections 3.1 and 3.2 of 40 CFR Appendix A to Part 75

Table 5: Linearity Check for Gas Analyzers

Abatement Equipment	Monitoring Equipment	Serial Number	Testing Date(s)	Test Results
TRU 1	ABB	H005387002	2/4/2021*	Passed**
	Thermo Fisher Scientific	1192914959	11/24/2020	Passed
TRU 2	Thermo Fisher Scientific	12217818225	5/18/2023	Passed

*The tests were performed late one month after the project start date. The Reserve granted a variance to allow the late testing results.

**Passed results indicate that the error was determined to be less than 5% or less than 5ppm.

Table 6: Cycle Time Testing for Gas Analyzers

Abatement Equipment	Monitoring Equipment	Serial Number	Testing Date(s)	Test Results
TRU 1	ABB Thermo Fisher Scientific	H005387002 1192914959	2/4/2021* 2/2/2021*	Passed** Passed
TRU 2	Thermo Fisher Scientific	12217818225	5/18/2023	Passed

*The tests were performed late one month after the project start date. The Reserve granted a variance to allow the late testing results.

**Passed results indicate that the monitoring system can complete at least one cycle of sampling, analyzing, and data recording every 15 minutes.

Table 7: Initial Certification RATA and Bias Testing for Flow Meters and Gas Analyzers

Abatement Equipment	Monitoring Equipment	Serial Number	Testing Date(s)	Test Results
TRU 1	Rosemount Rosemount Kurz ABB Thermo Fisher Scientific	0065970 0065971 10144 H005387002 1192914959	1/14/2021 12/6/2020 12/5/2020 12/5/2020 12/5/2020	1.29% 0.90% 3.05% 4.50% 1.43 ppmvd
TRU 2	Rosemount Kurz Thermo Fisher Scientific	22SHPE0158676 10374 12217818225	8/9/2023 8/3/2023 8/3/2023	1.4% 6.4% 2.27 ppmvd

RATA testing was conducted by Montrose Air Quality Services using methods in accordance with 40 CFR Appendix A to Part 75 and U.S. EPA test method 320. AWT verified that the project met all Protocol and variance requirements for CEMS installation and certification.

3.1.3 CEMS QA/QC Requirements

The Protocol requires ongoing daily, quarterly, and annual/semi-annual QA/QC procedures to be performed for the CEMS. AWT reviewed the following evidence to ensure the project satisfied the Protocol requirements:

Daily Requirements

AWT reviewed records of daily calibration error tests that were performed for the N_2O analyzers and the TRU outlet flow meters. The flow meters and analyzers are configured to automatically perform the daily error tests and the CEMS records the results. The project was granted a variance, dated 5/19/2021, for use of a method other than the calibration error test required by the Protocol for the TRU 1, SCR, and TRU 2 inlet flow meters. The variances applies for the entire crediting period or until the project discontinues operation or use of the Rosemount Smart Transmitter. AWT verified that all daily testing satisfied the requirements within both Protocol Section 6.2.1 and the variance. For periods when the calibration error test failed, the monitoring equipment was checked again and passed, or was considered out of control and data substitution was applied for the monitored parameter.

Quarterly Requirements

AWT verified the following quarterly procedures were performed according to Protocol requirements:

- Linearity – For TRU 1, the inlet analyzer had linearity checks performed on 7/17/2024 and 10/16/2024; the analyzer passed both tests. The TRU1 outlet analyzer was down during the third quarter of 2024 and thus did not require a linearity check; it passed the linearity check conducted on 10/25/2024.

  For TRU 2, the outlet analyzer had a linearity check performed on 10/18/2024 and the analyzer passed. No linearity checks were performed for the TRU 2 outlet analyzer during the third quarter of 2024 as a RATA was completed on 7/25/2024.
- Leak Check – Leak checks are included under the variance determinations dated 5/19/2021 and 12/26/2023 and are thus handled by the Smart Transmitter system. The TRU 1 and 2 outlet flow meters are thermal mass flow meters and do not require leak checks.
- Flow-to-Load or Heat Rate Evaluation – The project is exempted from performing this quarterly assessment as the adipic acid plant within the project boundary does not produce electrical or thermal output.
- Data Validation – AWT verified that all the QA/QC results were within the ranges required by the Protocol.

Annual and Semi-Annual Requirements

AWT reviewed the most recent RATA reports for the flow meters and gas analyzers. The RATAs were performed by Montrose Air Quality Services using methods outlined in 40 CFR, Part 75, Appendix A and U.S. EPA test method 320. The results of the tests are presented in the table below:

Table 8: Current RATA Testing for Flow Meters and Gas Analyzers

Abatement Equipment	Monitoring Equipment	Serial Number	Testing Date(s)	Test Results
TRU 1	Rosemount	0065970	2/29/2024	4.5%
	Rosemount	0065971	7/25/2023	1.74%
	Kurz	10144	2/29/2024	2.6%
	ABB	H005387002	2/29/2024	5.6%
	Thermo Fisher Scientific	1192914959	2/29/2024	7.4 ppmvd
TRU 2	Rosemount	22SHPE0158676	7/24/2024*	5.2%
	Kurz	10374	7/24/2024*	6.7%
	Thermo Fisher Scientific	12217818225	7/24/2024*	2.7 ppmvd

*RATA testing for TRU 2 equipment was conducted from 7/24/2024 – 7/25/2024.

The relative accuracy for each instrument is within the Protocol's allowable threshold for annual testing (<7.5%). Several flow meters required a Bias Adjustment Factor (BAF) to correct for bias found during testing. AWT verified that the BAF was correctly applied to the appropriate raw data. Details of the meters requiring the BAF are presented in the table below:

Table 9: Bias Adjustment for Flow Meters and Gas Analyzers

Abatement Equipment	Monitoring Equipment	Serial Number	Bias Adjustment Factor
TRU 1	Rosemount Rosemount	0065970 0065971	1.038 1.014
TRU 2	Kurz	10374	1.066

3.1.4 Baseline Approach

The Phlogiston project uses the Static Baseline Approach for calculating the average N_2O abatement efficiency. The Static approach requires operational data for the five most recent calendar years prior to the project start date. Therefore, the Phlogiston project uses operational data from 2015 – 2020 to calculate baseline abatement efficiency.

Due to how the adipic acid plant is set up to send off gas to the control units and non-control units at the same time, ClimeCo used the following 16 data sets to determine the baseline N_2O production and destruction:

1. Standalone off gas flow to only TRU 1
2. N_2O concentration for off gas flow to only TRU 1
3. Standalone off gas flow to the SCR
4. N_2O concentration for off gas flow to the SCR
5. Standalone off gas flow to only TRU 2
6. N_2O concentration for off gas flow to only TRU 2
7. Split off gas flow to TRU 1 for when off gas is split between TRU 1 and either SCR or TRU 2
8. Split off gas flow to TRU 2 for when off gas is split between TRU 2 and either SCR or TRU 1
9. Split off gas flow to SCR for when off gas is split between SCR and either TRU 1 or TRU 2
10. N_2O concentration to TRU 1 for when off gas is split between TRU 1 and either SCR or TRU 2
11. N_2O concentration to TRU 2 for when off gas is split between TRU 2 and either SCR or TRU 1
12. N_2O concentration to SCR for when off gas is split between SCR and either TRU 1 or TRU 2
13. Split off gas flow to TRU 1 for when off gas is split between all control and non-control units
14. Split off gas flow to TRU 2 for when off gas is split between all control and non-control units
15. Split off gas flow to SCR for when off gas is split between all control and non-control units
16. N_2O concentration for off gas flow split between all control and non-control units

The Reserve approved ClimeCo's method for calculating baseline N_2O production and destruction in the look-back period. AWT reviewed ClimeCo's baseline calculations and performed recalculations as part of verifying the baseline approach. There was no material difference between ClimeCo's baseline calculations and AWT's recalculations.

The threat of leakage is determined to be minimal because the project is located in the only facility owned and operated by Ascend that produces adipic acid. AWT verified that since the project start date, the Ascend plant has not exceeded the facility's Title V maximum permitted production volume for adipic acid.

3.1.5 Equipment and Vehicles Utilized

There were several pieces of equipment described in project documentation and observed during the previous site visit that must be accounted for in terms of baseline and project emissions. Electricity usage from various pumps, blowers, coolers, and monitoring equipment was estimated based on the recorded operating hours during the reporting period. Natural gas usage by the TRUs was determined by recorded flow readings. There are no equipment or emissions associated with steam export for the project.

3.1.6 Staff and Management of System

The facility is managed by appropriately trained staff members. ClimeCo employees have received proper training to ensure they are aware of the process management protocols as well as the data management protocols.

The facility is governed by a Title V regulatory permit. There are also routine inspections performed by regulatory personnel.

3.2 Site Audit

A site visit was not required for this reporting period due to the following conditions being satisfied (CAR Verification Manual, February 2021, Section 4.5.1).

1. The previous site visit was performed less than 12 months prior to the verification.

2. The current verification is being conducted by the same verification body that conducted the site visit for the previous verification.

3. There were no significant changes in data management systems, equipment, or personnel since the previous site visit.

3.3 Desk Audit

A desk audit was performed to determine if the asserted emission reductions meet all eligibility requirements, contained no existing material non-conformance or misstatements in the reported data and that the project was conducted in accordance with all monitoring and record-keeping requirements.

The desk audit focused on the Monitoring Report and the associated data and documentation provided. Data used in the calculations for this project were sampled according to AWT's Evidence Gathering Plan. The Evidence Gathering Plan was developed using a risk-based analysis of the project data systems and crosschecks.

The desk audit included a complete recalculation of the emission reductions using a tool developed by the verification team. This is further discussed in Section 3.3.9 of this report.

Data substitution was required and performed throughout the reporting period. The data acquisition and handling system (DAHS) is programmed to automatically calculate data substitution values as required by Section 6.3 of the Protocol. AWT verified proper function of the DAHS data substitution and that the values were appropriately substituted.

3.3.1 Eligibility

This project is eligible under the Protocol because it meets all the criteria for a project to be deemed eligible. The following points should be noted with respect to the project's eligibility:

1) The project is located in Cantonment, FL.
2) The project start date is January 20, 2021. (See Section 3.3.2)
3) The project is additional. (See Section 3.3.3)
4) The project is materially compliant with all applicable laws and regulations. (See Section 3.3.5)
5) The project is within its first 10-year crediting period (January 20, 2021 through January 19, 2031). (See Section 3.3.2)

3.3.2 Start Date and Crediting Period

The start date for the project is January 20, 2021 and the submittal form was completed on February 23, 2021. This date was documented in the original project submittal form file and is consistent with the certification documents for the original RATA and bias tests for the CEMS. The project is within its first 10-year crediting period (January 20, 2021 through January 19, 2031). This project meets the start date and crediting period requirements of the Protocol.

3.3.3 Additionality Assessment

This project is additional according to the standards of the Protocol because it meets or exceeds the Performance Standard Test and the Legal Requirement Test.

The Performance Standard Test is met because this project is an enhancement of an N_2O control system at an adipic acid plant. The N_2O abatement efficiency improvement allows the project scenario to be better than business-as-usual levels. Adipic acid projects automatically pass the performance standard test by enhancing existing N_2O control technology as defined by Section 3.4.1 of the Protocol.

The Legal Requirement Test is met because there were no laws, regulations or other requirements that require this facility to abate N_2O emissions. After a review of the project documentation provided by the Technical Consultant and a review of documentation that is publicly available (regulatory websites, etc.), there is a reasonable level of assurance that there are no laws, regulations or other stipulations that require this project activity. The following documents were reviewed to ensure the Legal Requirement test was met:

- Title V Permit

The Additionality Assessment was verified through a review of the documentation provided including interviews of the operation's management, review of applicable laws and regulations, and the

Attestation of Voluntary Implementation. Interviews of the project staff were also in agreement that there is no legal requirement to regulate abate N_2O emissions and the project is voluntarily implemented.

3.3.4 Ownership of GHG Offset Credits

Based on the documentation provided and the interviews conducted during the site audit, the emission reduction credits and attributes are fully owned by Ascend Performance Materials Operations LLC. The Attestation of Title was reviewed to verify the ownership of the emission reduction credits. All the interviews and documentation showed that Ascend is granted "full, unencumbered legal title to emission reductions and any resulting credits registered. . ." ClimeCo is the technical consultant to the project and does not claim ownership of the credits generated.

3.3.5 Regulatory Compliance

There were two Notices of Violation or Non-Compliance reported for the adipic acid plant during the reporting period. The first violation was for the failure to set the oxygen level of a boiler unit to no lower than the lowest hourly average oxygen concentration measured during the most recent carbon monoxide performance test. The second violation was for the failure to submit the results of the biennial emission factors testing no later than 45 days after the completion of the testing. Both of the violations were determined to be unrelated to project activities and therefore do not have a material impact on reported emissions reductions.

Various documents and databases were reviewed to check the compliance history for the project. The EPA ECHO database lists active issues for the facility, however these issues appear to have been identified and pertain to prior reporting periods and ECHO has not been updated to show the current compliance statuses. AWT did not discover any violations or non-compliances indicated by EPA ECHO during the review of the Florida Department of Environmental Protection public compliance and enforcement databases. The Attestation of Regulatory Compliance was executed by Ascend and reviewed by AWT.

The following documents and sources were reviewed to determine the regulatory compliance of the facility:

1) Attestation of Regulatory Compliance
2) US EPA ECHO website which provides compliance and enforcement information for listed facilities.
3) US Department of Labor OSHA website which provides compliance and enforcement information for listed facilities.
4) The Florida Department of Environmental Protection OCULUS database which provides permitting, compliance, and enforcement information for facilities located in Florida.
5) The Florida Department of Environmental Protection Information Portal database which provides permitting, compliance, and enforcement information for facilities located in Florida.

1.3.6 Environmental and Social Safeguards

According to the Environmental and Social Safeguards Assessment Form for the project and observations made during the desk audit, the project is reasonably assured to not undermine progress on other environmental issues such as air and water quality, endangered species and natural resource protection, and environmental justice, and social issues such as human rights and free and prior informed consent.

3.3.7 Monitoring

There are several key parameters that are monitored for this project to ensure compliance with the Protocol. The following parameters were monitored during the verification period:

A) Adipic Acid Production Records: The total volume of adipic acid produced during the reporting period was aggregated and provided to AWT for review. The data was based on monthly inventory reports.

B) Project Emission Monitoring: Off gas flow and concentration records were automatically recorded by the CEMS. Electricity usage was estimated based on equipment operating hours and natural gas usage was recorded by a utility meter. ClimeCo aggregated the records and provided to AWT for review.

C) Monitoring of Regulatory Compliance: Regulatory databases were reviewed to determine regulatory compliance. This was further verified through site management interviews and the Attestation of Regulatory Compliance. No evidence of violations or noncompliance during the reporting period were discovered during the investigation.

D) Ongoing QA/QC Documentation: The CEMS automatically performs and records several of the required ongoing QA/QC tests. RATA and bias testing were performed by Montrose Air Quality Services. Copies of the QA/QC records were provided.

3.3.8 Project Implementation and Management of Data

The adipic acid production operation utilizes a system that relies heavily on automation and automatic record keeping. The process data generated from this system can easily be exported to external computers. All the activities related to the data are handled by highly qualified individuals. The project owner (Ascend) is primarily responsible for the collection of monitoring and recorded data. The technical consultant (ClimeCo) is primarily responsible for the calculation of Emission Reduction credits. The individuals who have performed this work are also highly trained and qualified to perform these duties.

A Monitoring Plan was developed during the verification activity. This Monitoring Plan is sufficiently rigorous to ensure the proper data is maintained for the project to meet the requirements of the Protocol. The Monitoring Plan is also being properly implemented by the project operations team.

3.3.9 Calculations Review

A review of the asserted calculations was made to check for discrepancies, omissions, or misreporting in the quantification of the Emission Reductions. The calculation checks included a recalculation of Baseline and Project Emissions. The calculation reviews allowed for a reasonable level of assurance that there were no material errors in either the calculations or the data aggregations. Further discussion of this is included in Section 3.4 of this report.

3.3.10 Documentation Review

The following documents were reviewed during the verification process:

A) Monitoring Plan
B) Attestation of Title
C) Attestation of Voluntary Implementation
D) Attestation of Regulatory Compliance
E) Title V Permit
F) Start Date Documentation
G) Regulatory Compliance Documentation
H) QA/QC Documentation for CEMS
I) CEMS data for N_2O production and abatement
J) Information related to electricity and fossil fuel use
K) Project diagram and schematic
L) Baseline look-back documentation
M) Data aggregation spreadsheets
N) Project Data Report
O) SDG Reporting Tool
P) Social Environmental Safeguards Assessment form
Q) Emission Reductions Calculation Tool

3.4 Accuracy of Asserted CRT Calculations

Emission reductions were asserted by ClimeCo in their Monitoring Plan and calculation spreadsheets. These emission reduction calculations were checked by the verification team to ensure they are free of material errors. See Section 2.4 for information on how the verification team implemented the Evidence Gathering Plan.

The following Table shows the Emission Reductions credited to the Project.

Table 10: Emission Reductions Credited to the Project (July 1, 2024 – December 31, 2024)

	Baseline Emissions (MT CO_2e)	**Project Emissions (MT CO_2e)**	**Emission Reductions (MT CO_2e or CRTs)**
Asserted Emission Reductions	2,755,524	6,403	2,749,121
Verification Recalculation Emission Reductions	2,755,524	6,468	2,749,056

*Typical rounding rules were applied to this result.

Percent Error is calculated to be 0.002%. Percent error is the difference between the stated reductions and verified reductions divided by the total verified reductions and reported as a percent. There is less than 1% discrepancy between AWT's calculations and the project developer's calculations. The slight difference between the calculated emission reductions is the result of variations in data aggregation and rounding.

$$\%Error = abs\ \frac{(Stated\ reductions - Verified\ reductions)}{Verified\ reductions} \times 100$$

4. Verification Conclusion

Based on the information provided to AWT and through the verification activities performed,

a) There are no existing material non-conformance or misstatements in the reported data.
b) The project meets all eligibility requirements.
c) The project was conducted in accordance with all monitoring and recordkeeping requirements.

Travis Sexton	2/26/2025
Travis Sexton **Lead Verifier**	**Date**
Hal Langenbach	2/26/2025
Hal Langenbach **Internal Peer Reviewer**	**Date**