



# Verification Report for

Rentech Energy Midwest Corporation –  
Nitric Acid Plant 1  
CAR811

Eleventh Reporting Period  
September 27, 2018 to February 8, 2019

Nitric Acid Production  
Project Protocol, Version 2.0  
May 1, 2019

Report Prepared for

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## Summary

East Dubuque Nitrogen Fertilizers, LLC (“EDNF”) is the project developer for the “Rentech Energy Midwest Corporation – Nitric Acid Plant 1 (Project) located in East Dubuque, IL. In this Eleventh reporting period, EDNF reported on its nitrous oxide reduction results during its 22<sup>nd</sup> nitric acid production campaign that commenced on September 27, 2018, and concluded on February 8, 2019. NSF Certification, LLC (NSF) was engaged to verify the nitrous oxide emission reductions achieved by destroying nitrous oxide (N<sub>2</sub>O) via a tertiary abatement catalyst during one campaign in accordance with the requirements of the Climate Action Reserve Nitric Acid Production Project Protocol, Version 2.0. EDNF reduced emissions into the atmosphere by 39,940 metric tons of carbon dioxide-equivalent in this reporting period.

## 1. Introduction

### 1.1 Objective

The objective of this verification audit was to determine, with reasonable assurance, that EDNF had quantified, monitored, and fairly reported to the Climate Action Reserve its emission reductions from the abatement of nitrous oxide emissions during nitric acid production and to confirm the project’s eligibility.

### 1.2 Scope

The scope of the engagement included verification of the quantification, monitoring and reporting of greenhouse gas emission reductions from the project. It also included verification of the project’s eligibility and the calculation of project emissions of nitrous oxide measured in the nitric acid plant stack.

### 1.3 Criteria

NSF verified the reported project emission reductions against the following criteria:

- Climate Action Reserve Nitric Acid Production Project Protocol, Version 2.0 (September 28, 2011), (hereafter, the “Protocol”)
- Nitric Acid Production Project Version 2.0 Protocol Errata and Clarifications (January 3, 2017)
- Climate Action Reserve’s Program Manual (September 1, 2015).

The verification methodology conformed to requirements in:

- Climate Action Reserve’s Verification Program Manual (February 8, 2017), and
- ISO 14064:2006 Part 3, *Greenhouse gases – Specification with guidance for the validation and verification of greenhouse gas assertions*.

### 1.4 Materiality

In accordance with the Climate Action Reserve Verification Program Manual, the threshold for materiality of emission reduction assertions was based upon annualized rates of issuance of Climate Reserve Tonnes (CRTs). As the project claimed more than 100,000 metric tons of

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emission reductions on an annualized basis during the reporting period, the emission reduction assertion was considered fairly stated if it varied by no more than 1% from a complete statement of the Project's emission reductions. Thresholds of materiality defined by the Verification Program Manual allowed verifiers of emission reduction reports to consider as immaterial discrepancies of 1% or less.

### 1.5 Level of Assurance

This engagement was performed at the reasonable level of assurance.

## 2. Verification Approach

### 2.1 Team Appointment and COI Review

This verification was performed by Tina Sentner, Lead Verifier. The verification was internally reviewed by John Shideler, Lead Verifier. Conflict of Interest inquiries were completed for NSF, for the verification team, and for the independent reviewer, and a finding of low COI risk was confirmed by the Climate Action Reserve.

### 2.2 Document Review

The verification team conducted a document review to inform the planning process in advance of performing verification activities. Documents and records reviewed were provided by EDNF, and by ClimeCo Corporation, the project developer's consultant. Documents reviewed included previous project verification reports; project documentation submitted to the Climate Action Reserve; the project Monitoring Plan; spreadsheets providing logged hourly raw operating data and calculations of emission reductions; CEMS, gas flow meter, and methane analyzer calibration and verification records; regulatory compliance information from the US EPA Enforcement & Compliance History Online (ECHO) report and from company records; and manufacturer's information related to monitoring equipment.

### 2.3 Planning

NSF's verification approach is risk-based. It draws upon our understanding of risks to the fair statement of reported emissions and the operation of controls to reduce such risks. As a result of the document review and correspondence with EDNF and ClimeCo personnel, a verification plan and a sampling plan were developed for this engagement.

### Verification Activities

For this eleventh reporting period, verification activities commenced on October 3, 2018, with a kick-off teleconference with ClimeCo and EDNF. NSF conducted a site visit to the nitric acid facility in East Dubuque, IL on October 31, 2018. Verification activities for this engagement included:

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- Confirmation of the project start date and plant location.
- Verification of the ownership of the emission reduction credits earned by this project.
- Verification that the project monitored legal and regulatory changes and that the project continued to meet the legal requirement test for continuing eligibility under applicable laws and regulations.
- Verification that the project campaign was operated in material compliance with applicable environmental and safety laws.
- Demonstration by the project developer that none of the exclusions to eligibility applied to the nitric acid production campaign conducted during this reporting period.
- Review of Project compliance with monitoring requirements and that any identified variances have been approved by the Climate Action Reserve and appropriately applied.
- Verification that applicable sources, sinks and reservoirs were included in the project assessment boundary.
- Verification that the project developer correctly calculated permitted operating ranges for temperature and pressure in accordance with protocol requirements.
- Assessment of the adequacy of the control environment, information management systems, and monitoring plans of the Project.
- Inquiries concerning the records management system implemented for acquisition and retention of all Protocol required information.
- Verification of the project emission reduction calculations.

### 3. Verification Findings

#### 3.1 Project Description

EDNF installed and operated a new tertiary abatement catalyst in the tail gas steam leaving the secondary absorption tower at its Nitric Acid Plant 1 in East Dubuque, Illinois. The tertiary catalyst decomposes  $N_2O$  and subsequently reduces the quantity of  $N_2O$  that would have otherwise been released to the atmosphere. Nitric Acid Plant 1 is a single pressure Nitric acid plant and has been in operation since 1978. The facility also includes a plant for ammonia production, a plant for urea production, and a second plant producing nitric acid known as Nitric Acid Plant 2.

NSF verified that the plant was out of operation and restarted well before December 2, 2007, and thus it meets all aspects of the project definition stipulated in the Protocol. The facility also includes an ammonia plant, a urea plant, and Nitric Acid Plant 1. NSF confirmed via review of

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plant drawings and permits that the plant had not used nonselective catalytic reduction (NSCR) technology at any point prior to or during the Project.

In this eleventh reporting period, the “Rentech Energy Midwest Corporation – Nitric Acid Plant 1 abated 39,940 metric tons of carbon dioxide–equivalent greenhouse gas emissions from one campaign that would have been emitted into the atmosphere absent the application of tertiary catalytic reduction technology. Campaign 22 started on September 27, 2018, and concluded on February 8, 2019. Campaign 22 was originally supposed to be included in report period 10, but the campaign ended up extending beyond the reporting period requirements and therefore is separately reported here.

### 3.2 Eligibility

**Location.** The project is located at a nitric acid plant in East Dubuque, IL. This facility met the protocol requirement for location in the United States.

**Project Start Date.** The start date of the Project is defined by the Protocol as the date on which production commences after the first installation of a tertiary catalyst. This start date was verified by reviewing documentation for tertiary abatement catalyst installation conducted on June 27-28, 2011. NSF confirmed the commencement of nitric acid production for the first reporting period campaign on June 29, 2011. Based on this review, NSF concluded the start date was June 29, 2011.

In addition, the project must be submitted for listing on the Reserve website no more than six months after the project start date or anytime prior to the Project start date. NSF confirmed the project list form was submitted in prior to the Project start date and met this eligibility requirement.

**Crediting Period.** The crediting period for the Project is June 29, 2011 to June 28, 2021. This eleventh reporting period is within the crediting period for the Project.

### 3.3 Additionality

**Legal Requirement Test.** NSF confirmed the project monitoring plan included procedures to ascertain and demonstrate that the Project at all times passed the Legal Requirement Test. During the site visit, the verification team interviewed the site’s manager concerning the methods for monitoring legal and regulatory developments. In accordance with their procedure, EDNF tracked changes to regulations affecting nitric acid production via regulatory newsletters, and through the regulatory team of East Dubuque Nitrogen Fertilizers, LLC. NSF also reviewed the Title V operating permit and New Source Review (NSR) permit and found no requirements for tertiary abatement of nitrous oxide emissions. The facility did not have a Prevention of Significant Deterioration (PSD) permit nor was it subject to PSD Tailoring rule requirements.

Lastly, NSF reviewed the Attestation of Voluntary Implementation signed on April 30, 2019, by an appropriate representative for EDNF for this reporting period. Based on this review, NSF has concluded that there were no legal requirements that mandated the abatement of N<sub>2</sub>O at the

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project site, that the Project met the Protocol's monitoring requirement for voluntary implementation, and that the Project continued to pass the legal requirement test.

**Performance Standard Test.** EDNF had installed a tertiary N<sub>2</sub>O abatement catalyst in the tail gas stream of its nitric acid plant in East Dubuque, IL. During the site visit, NSF reviewed the documentation for tertiary abatement catalyst equipment installation and work plans for replacement of the primary catalyst, along with records of N<sub>2</sub>O production for the Project's first campaign. NSF has concluded that the Project has met the Performance Standard Test.

### 3.4 Regulatory Compliance

**Regulatory Compliance.** NSF verified EDNF's regulatory compliance by reviewing the US EPA ECHO report. NSF observed that the ECHO report noted the facility was out of compliance with the Clean Water Act during two quarters of the reporting period. NSF interviewed site personnel who explained that the issue noted in ECHO is a result of Discharge monitoring reports (DMR) that noted exceedance levels of ammonia from de-icing of the NPDES treatment units that is not associated with the nitric acid plants. NSF also reviewed the Illinois EPA Explorer database and conducted an interview with a compliance officer at Illinois EPA. Neither source recorded any violations or enforcement actions related to the reporting period. NSF reviewed the facility's Title V Annual Compliance Certification and found that the facility had reported several deviations that happened during the reporting period. The deviations were reviewed by the verification team and all were confirmed to be unrelated to the Project activity and not a result of the Project.

NSF also reviewed the Attestation of Regulatory Compliance completed by EDNF for the eleventh reporting period dated April 30, 2019. From these verification activities, NSF concluded that the project was in material compliance with regulatory requirements during the project's eleventh reporting period.

### 3.5 Ownership

**Project Developer and Ownership.** The Project is owned by EDNF and has full rights to any emission reductions associated with the plant. NSF reviewed the Project Developer's construction permit for the N<sub>2</sub>O abatement catalyst bed for the plant, issued by the Illinois EPA, naming the company as owning the plant. ClimeCo Corporation is a technical consultant to EDNF. NSF reviewed the "Designation of Authority" in which the Project Developer designated authority to ClimeCo as the Account Holder Agent on the Reserve website. NSF reviewed corporate documentation confirming the ownership status change. In addition, East Dubuque Nitrogen Fertilizers, LLC attested to its ownership of the greenhouse gas emission reduction credits through a signed Attestation of Title dated April 30, 2019. From this evidence NSF has concluded that East Dubuque Nitrogen Fertilizers, LLC was the legal owner of the greenhouse gas emission reduction credits during this reporting period.

### 3.6 Project Boundaries and Emission Sources

**Sources, Sinks and Reservoirs.** NSF has verified that for this reporting period, the relevant sources, sinks and reservoirs (SSRs) were identified. The Project has no ammonia input to the

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N<sub>2</sub>O destruction facility, uses no hydrocarbons as reducing agents or for reheating the tail gas, and has no external energy input to reheat the tail gas. Therefore, N<sub>2</sub>O is the only GHG included from the Baseline and Project activities for this Project.

### 3.7 Project Management System

**Management System.** NSF reviewed relevant aspects of the EDNF plant's management system during its on-site visit on October 31, 2018, and via document review and interviews during this reporting period. NSF found a mature management system and competent personnel. Safety training was required for access inside the plant and procedures were in place for plant operation and environmental management. NSF included the following management systems elements in its evaluation:

- Definition and maintenance of an appropriate control environment by EDNF
- Training and competence of project managers and operating/data management personnel
- Identification and management of legal requirements related to nitric acid production
- Identification and maintenance of records required by the project
- Selection, installation, maintenance, calibration and monitoring of the Continuous Emissions Monitoring System (CEMS), stack gas analyzer, and flow metering equipment
- Quantification methods and calculations of project emissions; and
- Checking and corrective action mechanisms.

From information gathered during the site visit through observations, interviews and records reviewed, NSF has concluded that EDNF's management system met the requirements described in the Climate Action Reserve's Verification Program Manual.

**Project Documentation and Reserve Tracking System.** NSF verified that the required documents for the Project had been completed and submitted to the Reserve. These included a Project Submittal form, uploaded at the beginning of the Project; signed attestations of title, of regulatory compliance, and of voluntary implementation for this reporting period; a project diagram, and an assertion of Climate Reserve Tonnes earned during the campaign.

### 3.8 Performance Against Project Protocol/Methodology

The Project was implemented in conformity with the Climate Action Reserve Nitric Acid Production Project Protocol Version 2.0.

**Monitoring and Operations Plan.** NSF reviewed the Monitoring Plan for the Nitrous Oxide Abatement Project and confirmed the plan addressed monitoring, operations and reporting of relevant parameters included in Table 6.1 of the Protocol, including the frequency of data acquisition, the frequency of instrument field check and calibration activities, and the roles of individuals performing each specific monitoring activity. It also defined record keeping requirements and described the procedure EDNF used to determine that the project at all times met the Legal Requirement Test. NSF concluded from its review that the monitoring plan covered all aspects of monitoring and reporting contained in the Protocol.

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**Use of CEMS.** An EcoChem Continuous Emissions Monitoring System was used to directly measure N<sub>2</sub>O concentration and gas flow rate in the stack gas. A Kurz thermal resistance mass flow meter (model 155B/KBAR-2000B) was used to measure gas flows and two EcoChem MC3 Analytics Infrared Gas analyzers, one upstream of the tertiary abatement system (inlet) and one downstream of the system (outlet), were used to measure N<sub>2</sub>O concentration. N<sub>2</sub>O concentration and gas flow rate parameters were monitored continuously but logged in hourly increments along with stack temperature and pressure and the air-to-ammonia ratio and ammonia flow. The Project used the CEMS DAHS coupled with a PLC that consolidated the data. The data was stored on the server with regular backup as well as on an external hard drive in the system. The record keeping and reporting of the data were processed by the EcoChem computer, which monitored CEMS status and to generate reports in the required formats and provided to plant management. The CEMS was maintained in accordance with a quality assurance/quality control program as defined in Appendix B to Part 75 of the Clean Air Act, Subpart H: NO<sub>x</sub> Mass Emissions Provisions. NSF concluded that the CEMS operated normally during the project reporting period.

**Initial Certification of the CEMS.** The Project developer was required to follow the requirements for CEMS installation and initial certification as noted in 40 CFR Part 60 Section 60.13, 40 CFR Part 60 Performance and Specification 2 of Appendix B, and 40 CFR Part 75 section 6 of Appendix A.

EDNF installed part of the NAP's CEMS several years prior to commencing the Project for NO<sub>x</sub> compliance reasons. NSF verified that the Project met all CEMS installation and certification requirements of the Protocol:

- **7-day Calibration Error Test**

The Project submitted the calibration drift summary for the flow meter on July 14, 2010–July 20, 2010; the inlet analyzer on June 22, 2011–June 28, 2011 and the outlet analyzer on July 14, 2010–July 20, 2010. The tests were conducted prior to the Project initiation. NSF confirmed the percent calibration errors were within allowable tolerance and was in compliance with 40 CFR Part 75.

- **Linearity Check**

The Project conducted a Linearity Check on June 21, 2011. The analyzer met the linearity check requirement of <5.0% error.

- **RATA and Bias Tests**

The Project provided the results of the RATA that was conducted on June 22, 2011 for both the flow meter and the analyzer. The relative accuracy (RA) for both was within the allowable range and both passed the bias test. .

- **Cycle Time Test**

NSF reviewed the results of the cycle time test on August 16, 2010, which ensures that the monitoring system is capable of completing at least one cycle of sampling, analyzing, and data recording every 15 minutes and meets the requirements of 40 CFR Part 60.13(e)(2).

- **DAHS Verification**

NSF reviewed documentation and examples from the data acquisition and handling system (DAHS) that demonstrated that all emission calculations were performed correctly and that missing data substitution methods were applied properly.

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All CEMS components were installed by the manufacturers of the equipment or electrical contractors. From this evidence reviewed, NSF has concluded that the Project met the initial installation and certification requirements.

**Ongoing CEMS QA/QC and Frequency of Testing.** NSF verified that Quality Assurance/Quality Control procedures were implemented in accordance with Clean Air Act requirements of the U.S. Environmental Protection Agency, specifically those included in the Acid Rain Program regulations published at 40 CFR Part 75, Appendix B, as required by the Protocol. QA/QC procedures included daily, quarterly and annual assessments and scheduled preventive maintenance for the CEMS and its components.

- **CEMs Daily Testing.** NSF verified that EDNF had performed daily tests for both N<sub>2</sub>O analyzers to ensure the accuracy of the CEMS recorded data. Minimum pressures of the certified calibration gases were monitored to ensure accurate daily test results. Data to the CEMS were deemed valid as long as the daily calibration tests resulted in variation of no greater than 5% from the N<sub>2</sub>O analyzer span. Variations greater than 2.5% and less than 5% over a two-day period triggered automatic recalibration of the analyzer. Variations greater than 5% were considered calibration failures and were acted upon immediately by plant personnel. NSF viewed the raw data and results of each test, confirmed that the plant performs calibration adjustments if necessary, data validation daily, continuously monitors data and records data every minute, and performs QA checks. There were a few instances during the reporting period where the results of the automatic calibration error test indicated “warning” or “out of control”. Each time, the EcoChem system automatically recalibrated the analyzer and performed another test until the result indicates “Cal OK”. Most of the “Warning” or “Out of Control” periods corresponded to periods when the plant performed linearity checks, maintenance periods, and/or periods with application of the missing data substitution procedure.
- **CEMS Quarterly Testing.** NSF verified that EDNF had performed the following QA/QC on a quarterly basis:
  - NSF confirmed EDNF conducted daily flow meter calibration error checks. Calibration records for the reporting period were reviewed. There were a few instances where the daily calibration error check on the Stack flow meter appeared to read a false fail. Data substitution was not implemented as an immediate recalibration was conducted and the data remained valid. All other daily calibration checks for the flow meter during the reporting period were within the ±3% threshold. As a result, NSF confirmed the quarterly calibration error check requirement was met.
  - Linearity checks were performed in quarters for which there were no RATA for the EcoChem CEMS unit to determine the accuracy of the gas composition analyzers. A Linearity test was performed at low, mid and high levels of concentration as required by 40 CFR Part 75 Appendix B. NSF reviewed the linearity test record created for the inlet analyzer on 02/21/18, 05/22/2018, 07/31/2018, 08/01/2018, 2/5/2019. Records for the outlet analyzer were conducted on 02/14/2018,

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05/01/2018, 08/01/2018, 12/27/2018, and 02/05/2019. NSF verified that the results of all checks met Protocol and Part 75 requirements. The results were either within the required range for high-level gas concentrations and low- and mid-level concentrations or if the errors were greater than 5 percent, the ranges met an alternative criteria defined by Part 75 which also accepts checks if the difference between the average of the monitor response values and the average of the reference values is less than 5 ppm. NSF confirmed that all differences were less than 5 ppm for any checks that had greater than 5 percent error.

- Leak Testing was not applicable as EDNF utilized a thermal mass flow meter for the Project.
- Flow-to-load ratio or gross heat rate evaluation was not performed because the nitric acid plant did not also produce electricity or steam.

**CEMS Relative Accuracy Test Audit.** NSF verified that CEMS data used during the Project had been validated through the performance of a Relative Accuracy Test Audit (RATA) which was conducted on the CEMS unit on December 13, 2017 and December 5, 2018 by an independent third party in accordance with the requirements of 40 CFR Part 75 Appendix A, 7.4, and the test methods specified in 40 CFR Part 60, Appendix B, Performance Specifications 2 and 6. NSF checked online websites to confirm that the laboratory was certified by the Stack Testing Accreditation Council and the American Association of Laboratory Certification. The relative accuracy of the various equipment was as follows:

| Year      | N <sub>2</sub> O Inlet analyzer (ppmv) | N <sub>2</sub> O Outlet Analyzer (ppmv) | Flow Meter (scfm)           |
|-----------|----------------------------------------|-----------------------------------------|-----------------------------|
| 2017 RATA | 2.90%<br>BAF : 1.0                     | 2.54%<br>BAF applied: 1.02              | 1.86%,<br>BAF applied 1.015 |
| 2018 RATA | 0.95%<br>BAF: 1.007                    | 5.4%<br>BAF: 1.0                        | 0.9%<br>BAF: 1.0            |

All BAF adjustments were confirmed accurately applied to the data for the relevant time frame during this reporting period as per the requirements of Part 75 Appendix A Section 7.6.5.

Flow RATAs were performed at a single load level consistent with the steady-state operation of the nitric acid plant. The RATA showed that the flow meter met 7.5% accuracy and therefore a semi-annual RATA was not necessary.

**Data Management.** NSF verified that the project had logged operational data on a continual basis and exported data on an hourly basis for monitoring purposes. Data logged included stack flow, temperature and pressure, and N<sub>2</sub>O concentration prior to and after the tertiary abatement. Data were recorded in English measurement units for operational monitoring and converted for reporting purposes to metric units. NSF reviewed the conversion algorithms and determined that data had been properly reported in metric units.

ClimeCo compiled campaign comparison data files, which established emissions estimates and provided reviews to EDNF. The comparison looked for outliers and if any were detected, ClimeCo asked EDNF for explanations. NSF confirmed there were no outliers during this

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campaign. ClimeCo also produced records to review the reasonableness of the emission estimates. These data were part of the QA/QC records noted above. NSF found from review of these data that emission reductions during the 22nd campaign were in line with previous campaigns.

**Missing Data Substitution.** EDNF applied missing data substitution methods for a total of 19 hours for the inlet concentration, 15 hours for the outlet concentration and 7 hours for stack flow during the Project campaign. The EcoChem system runs a report from the DAHS that calculated substitute values based on the guidance in the Protocol and Part 75 Section 75.33. The missing data calculations were observed to be calculated correctly.

### 3.9 Calculation of GHG Emission Reductions

The emission reduction calculations assessment included a review of the historical, baseline, and Project assumptions, data inputs, data management and accuracy of calculations. NSF assessed the information generated from the historical, baseline, and the project campaign and evaluated the completeness of the data and how it is transferred from EDNF's DAHS to ClimeCo's GHG calculation database. NSF reviewed data downloaded from the CEMS and performed check calculations in the spreadsheet on values such as mean concentration of stack gas and the mean stack gas volume flow. The Kurz flow meter and N<sub>2</sub>O analyzers recorded data at 68 deg F and 1 Atmosphere. NSF verified that all data were normalized to 0°C and 101.325 kPa in the calculation spreadsheets. ClimeCo also performed unit conversions for several monitoring parameters. NSF confirmed that the conversions were performed correctly and that the raw data was converted to the units required by the protocol for all parameters.

#### **Previous Historical Data Review.**

The project was implemented at an existing NAP. There was sufficient data for the project to use five historical campaigns to calculate HNO<sub>3,MAX</sub>. NSF reviewed the raw data and statistical adjustments from the historical campaigns that were used to calculate the variable: HNO<sub>3,MAX</sub>. NSF verified the HNO<sub>3,MAX</sub> was correctly calculated. In addition, NSF reviewed the allowable operating conditions (AOCs) for temperature, pressure and ammonia-to-air ratio. On April 21, 2015 EDNF installed a new air compressor at the NAP. This was classified as an "upgrade", and thus the Project revised its previously defined AOCs according to 5.1.2 of the Protocol Errata and clarification #2. NSF verified the updated AOC's from review of a letter from a professional engineer involved with the compressor replacement.

The following values were verified:

- HNO<sub>3,MAX</sub> = 204.45 metric tons HNO<sub>3</sub>/hr
- Oxidation temperature: min. = 843.89°C, max. = 911.11°C
- Oxidation pressure: min. = 6.76 bar, max. 8.62bar
- Ammonia-to-Air Ratio: max. = 10.75%

#### **Baseline Emissions Review**

Project data consisted of two full campaigns for the reporting period. In accordance with the Protocol, tertiary abatement projects must sample the tail gas prior to entering the tertiary abatement catalyst. NSF confirmed the inlet analyzer continuously measured the N<sub>2</sub>O

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concentration in the gas. NSF confirmed EDNF calculated baseline emissions following section 5.2.2 for any time periods when actual average daily operating conditions for pressure, temperature, and ammonia-to-air ratio were outside of the AOCs. NSF also confirmed EDNF used the lesser of the calculated emissions from using either the IPCC emission factor or the straight calculation of  $N_2O$  was properly selected for each hour outside of the average daily operating conditions. NSF confirmed that the calculations for percent of time that the plant operated outside of the AOCs were less than 50 percent of the reporting period and the mean values for oxidation temperature, oxidation pressure, and ammonia-to-air ratio were within the corresponding AOC ranges.

### Project Emissions Review.

For project emissions, NSF confirmed the project sampled the tail gas downstream of the tertiary abatement catalyst. NSF compared the hourly data from the EDNF CEMS data to the hourly gas flow volumes and  $N_2O$  concentrations recorded in the campaign calculation spreadsheets. No material errors in the raw data or data transfers to the calculation spreadsheet were identified. NSF confirmed that the operating conditions for campaign 22 were within the AOCs. NSF also reviewed the variable  $HNO_{3,RP}$ , as compared to  $HNO_{3,MAX,scaled}$ . In this reporting period, the following were noted:

Campaign 22:  $HNO_{3,RP}$  was greater than  $HNO_{3,MAX,scaled}$ .

NSF confirmed the project emissions were correctly calculated for each campaign based on equation 5.13 of the Protocol depending on whether  $HNO_{3,RP}$  was less than or equal to  $HNO_{3,MAX,scaled}$ . NSF reviewed the inputs to Equation 5.13, which calculated project emissions as the product of stack gas flow volume multiplied by the outlet  $N_2O$  concentration and the operating hours. The input numbers for this equation matched operating records. There were no project emissions from ammonia input to operate the tertiary catalyst, from the use of hydrocarbons as a reducing agent, or from hydrocarbons or external energy to reheat tail gas. NSF determined that the emission reduction calculations followed the Protocol and found no material misstatements in the final Project GHG reductions calculations and results.

### 3.10 Corrective Action Requests

NSF issued findings throughout the verification process. Details are provided to the project developer and to the Reserve in a List of Findings, a private document.

### 3.11 Approved Variances

There were no variances requested for the reporting period.

## 4. Verification Results

### 4.1 Verification Team Recommendation

## Project Verification Report

Based on the verification activities described above, the verification team has concluded that CAR811 project, “Rentech Energy Midwest Corporation – Nitric Acid Plant 1” Eleventh reporting period, has achieved the following emission reductions:

| Campaign emissions                            | Baseline Emissions | Project Emissions | Emission Reductions |
|-----------------------------------------------|--------------------|-------------------|---------------------|
| Vintage 2018                                  | 54,777             | 25,895            | 28,882              |
| Vintage 2019                                  | 20,973             | 9,914             | 11,058              |
| <i>Total Campaign 22</i><br>9/27/18 to 2/8/19 | 75,750             | 35,809            | 39,940              |

Final values rounded for simplicity

### 4.2 Verification Audit Summary

|                                                                                                   |                                                                                                                                                                                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Project Developer and location                                                                    | East Dubuque Nitrogen Fertilizers, LLC<br>16675 Highway 20 West,<br>East Dubuque, Illinois 61025                                                                                                                                                                                                                                        |
| Project Type                                                                                      | Nitric Acid N <sub>2</sub> O – Tertiary Catalyst                                                                                                                                                                                                                                                                                        |
| Project Period                                                                                    | September 27, 2018 – February 8, 2019                                                                                                                                                                                                                                                                                                   |
| Protocol/Methodology                                                                              | <ul style="list-style-type: none"> <li>• Climate Action Reserve, Nitric Acid Production Project Protocol, v. 2.0, (September 28, 2011).</li> <li>• Climate Action Reserve, Nitric Acid Production Project Protocol Errata And Clarifications (January 3, 2017)</li> </ul>                                                               |
| Emissions/Removals Verified                                                                       | Vintage 2018: 28,882 metric tons CO <sub>2</sub> -e<br>Vintage 2019: 11,058 metric tons CO <sub>2</sub> -e                                                                                                                                                                                                                              |
| Verification Conclusion                                                                           | Based upon the verification activities described above, NSF has concluded that East Dubuque Nitrogen Fertilizers, LLC – reported emission reductions of 39,940 metric tons CO <sub>2</sub> -e reported to the Climate Action Reserve for the period September 27, 2018 – February 8, 2019 are, in all material respects, fairly stated. |
| Lead Verifier                                                                                     | <br>Tina Sentner, May 1, 2019                                                                                                                                                                                                                        |
| Independent Reviewer                                                                              | <br>John C. Shideler, May 3, 2019                                                                                                                                                                                                                    |
| <i>This verification statement is valid when signed and dated by an NSF independent reviewer.</i> |                                                                                                                                                                                                                                                                                                                                         |

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