Relative Accuracy Test Audit
June 6, 2019

Seven Day Drift Test
May 20, 2019 – May 26, 2019

Sunoco Partners Marketing and Terminals, LP
Romulus Terminal
29120 Wick Road
Romulus, Michigan 48174

Zeeco Project No. 39734

Zeeco Inc.
11505 Commonwealth Dr.
Suite 104
Louisville, Kentucky 40229

DECLARATION OF ACCURACY

Certification of sampling procedures by the team leader of the personnel conducting the sampling procedures and compiling the test report:

"I certify that the sampling procedures were performed in accordance with the approved test plan and that the data presented in this report are, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below."

Signature: Tony Fenton Name of Person Signing: Tony Fenton

Title: Environmental Test Technician Date: 6/20/19

Certification of test report by the senior staff person at the company who is responsible for checking the test report:

"I certify that this test report and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the test information submitted. Based on my inquiry of the person or persons who performed sampling and analysis relating to the performance test, the information submitted in this test report is, to the best of my knowledge and belief, true, accurate, and complete. All exceptions are listed and explained below."

Signature: James Stamm Name of Person Signing: James Stamm, P.E.

Title: Sr. Environmental Engineer Date: 6/20/19

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1.0 INTRODUCTION

1.1 Identification, Location and Dates of Test

Zeeco, Inc. was contracted by Sunoco Partners Marketing and Terminals, LP (Sunoco) to perform a Relative Accuracy Test Audit (RATA) / Calibration Drift Test on the Continuous Emission Monitoring System (CEMS) at their Bulk Marketing Terminal located in Romulus, Michigan. The test consists of two separate parts: The Relative Accuracy Test, which took place on June 6, 2019; and the Seven Day Drift Test, which took place between May 20, 2019 and May 26, 2019. Tony Fenton of Zeeco Inc. performed the relative accuracy testing.

1.2 Purpose of Testing

The exhaust from the VRU was sampled and analyzed to determine the Relative Accuracy (RA) and Calibration Drift of the CEMS at the terminal.

1.3 Description of Source

Sunoco owns and operates a bulk gasoline loading terminal in Romulus, Michigan. This terminal is designed to receive, store, and deliver fuel to tank trucks. These tank trucks then deliver the fuel to various gas stations in the area for distribution to customers. On site is a VRU that in conjunction with the loading rack and all connected piping of the vapor collection system is in place to minimize the release of Volatile Organic Compounds (VOC) during the loading process.

The VRU is equipped with two identical adsorbers, each filled with activated carbon as the adsorption media. At all times during loading operations one carbon adsorber is on-line to the loading rack to receive vapors while the other carbon adsorber is under the regeneration process. Motor Operated Valves automatically alternate between the two carbon adsorbers between adsorption and regeneration to ensure no interruption of loading at the rack.

To process the hydrocarbon vapor-air mixture, it flows through the on-line carbon adsorber. There, the activated carbon adsorbs the hydrocarbons and vents clean air to atmosphere through the exhaust vents.

Simultaneously, the second adsorber is under the regeneration process where the vacuum pump and purge air strip the vapors from the carbon and return the carbon's ability to adsorb vapor during the next cycle. The vacuum pump extracts the vapors and moves them to the absorber tower. The absorber tower is the final step in processing the vapors. The hydrocarbons flow up through the packed tower where it is subsequently recovered by absorption into a liquid gasoline absorbent. Any hydrocarbon vapor not absorbed during this process is routed back the carbon adsorber on-line to the loading rack for re-processing.

1.4 Contact Information

Sunoco Partners Marketing and Terminals, LP
Jared M. Everitt
Environmental Specialist
7155 Inkster Rd
Taylor, MI 48180
E-mail: jared.everitt@energytransfer.com

Zeeco, Inc.
Tony Fenton
Environmental Test Technician
11505 Commonwealth Dr. Ste. 104
Louisville, KY 40229
(918) 605-5401 mobile
Tony_fenton@zeeco.com

2.0 SUMMARY OF RESULTS

2.1 Executive Summary

The CEMS performs a self-span check at 24-hour intervals. This data is recorded by the system and was used for the seven-day drift test. The Seven Day Drift test results show the CEMS is in compliance with the applicable standards referenced in Appendix F of 40CFR60 and the all seven days were within the 2.5% drift requirements. A summary of the Seven-Day Drift Test appears in Appendix F of the test report.

The relative accuracy (RA) testing compares the reference method testing data to the CEMS data. The RA is displayed in Table 2-1 below.

Table 2-1 – RATA Results

Pollutant Measured	Performance Specification	Relative Accuracy	Applicable Limit	Pass/Fail
THC	Performance Spec. 8	0.465% RA_{AS}	<10%	Pass

3.0 SOURCE DESCRIPTION

3.1 Description of Process

The Sunoco terminal located in Romulus, Michigan is a bulk terminal for the loading and unloading of petroleum products. The facility has a Carbon Adsorption / Gasoline Absorption Hydrocarbon Vapor Recovery Unit (VRU).

A brief description of the VRU process is presented below. For a detailed description the vapor recovery unit's operations, please consult the manufacturer's equipment manual.

The vapor recovery unit (VRU) consists of the following components:

- Two carbon adsorption beds
- One countercurrent absorption tower
- One vacuum pump (for carbon regeneration)
- One continuous emission monitor system (CEMS)

Hydrocarbon vapors, generated from truck loading, enter one of two packed carbon beds or adsorbers. The two carbon adsorbers operate in parallel with one unit adsorbing hydrocarbons while the alternate adsorbing carbon bed is being regenerated. At this point, the remaining air stream is free of hydrocarbon contamination and is vented to the atmosphere.

The purpose of the regeneration step is to restore the carbon to a level where it will effectively adsorb hydrocarbons again. The two carbon adsorbers alternate between adsorption and regeneration at 15-minute intervals. When a carbon adsorber is being regenerated, a vacuum pump exerts a significant vacuum on the carbon adsorber vessel and desorbs the hydrocarbons from the carbon. The hydrocarbon vapors are then pumped downstream to the counter current absorber tower.

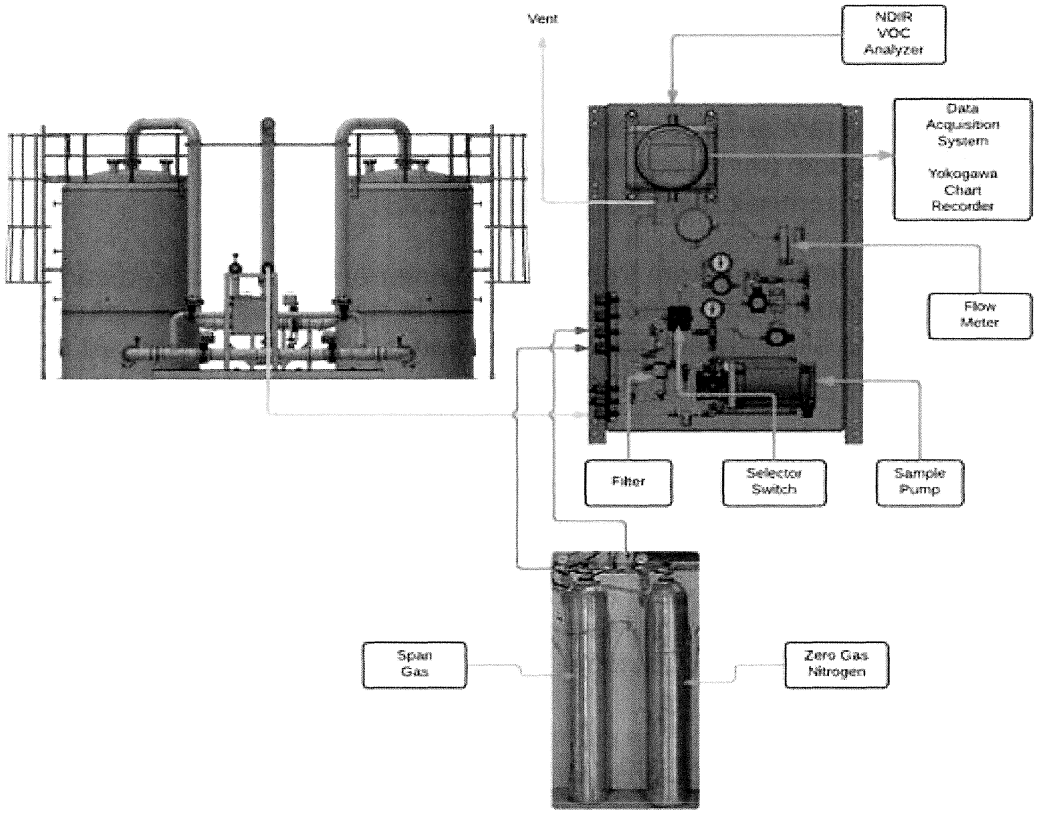
The hydrocarbons are absorbed by the counter flow of liquid gasoline feed in the absorber tower and are then pumped back to the terminal's gasoline storage tank. Any remaining vapors are routed back to the online adsorbing unit (carbon bed) for additional hydrocarbon removal.

The Continuous Emission Monitoring System (CEMS) analyzes the concentration of volatile hydrocarbons being emitted from the VRU exhaust stacks. The system is designed for 24-hour operation.

The CEMS's PLC continuously monitors the outlet VOC concentration from the VRU stack and imports the data to a HMI /PLC where it is saved. If the outlet VOC concentration is exceeded, an alarm is sounded to alert terminal personnel and fuel loading at the truck rack is automatically stopped. This prevents the terminal from exceeding the mg/L emission limit.

The CEMS employs a vacuum pump and associated sampling apparatus (tubing, filters, pressure relief valve, flow and pressure regulators, etc.) to obtain a representative exhaust sample. The sample is introduced to a Non-Dispersive Infrared Gas Analyzer (NDIR) for concentration determination and the signal output from the NDIR is connected to the HMI/PLC.

3.2 Typical Layout of Source



4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Description of sampling and field procedures

Testing of the CEMS Unit was made up of two separate parts: The Seven Day Drift Test and the Relative Accuracy Test.

Testing was conducted using the following Reference Methods found in Title 40, Part 60 of the CFR as well as specific agency approval:

- Appendix A, Method 25B VOC Emissions - Non-Dispersive Infrared Analyzer method.
- Appendix B, Performance Specification 8 VOC CEMS in Stationary Sources
- Appendix F Procedure 1 Quality Assurance Requirements for Gas Continuous Emission Monitoring System used for Compliance Determination

Seven Day Calibration Drift Test:

The purpose of the Seven Day Drift Test was to demonstrate the stability of the CEMS calibration over a period of seven (7) consecutive calendar days. No repairs or adjustments were made during this period. The calibration drift did not exceed ±2.5% of the span value after each 24-hour period at both zero and span levels.

Two calibration gases were used for the calibration drift test of Total Hydrocarbons. Both gases are the normal calibration gases used on-site for routine calibration procedures. One gas is a zero grade Nitrogen gas and the other is a nitrogen/ propane mixture at approximately 80% to 90% of the analyzers full scale span.

The calibration gases are introduced into the sampling system directly before the analyzer, bypassing the tubing from the sample port. No adjustments are made before the drift test and any adjustments needed are conducted after the drift test is performed. At 24-hour intervals the calibration gases are introduced to the CEMS and the response is recorded and subtracted from the reference value. The reference value is the value the analyzer is calibrated to see. The data is recorded on a field data sheet daily. To meet Performance Specification requirements for CEMS measuring regulated pollutants, the difference between the response value and the reference value must not exceed ±2.5%. After data is recorded the analyzer can be adjusted to the reference gas value.

Relative Accuracy Test:

The purpose of the Relative Accuracy Test was to measure the absolute mean difference between the gas concentration determined by the CEMS and the value determined by the Reference Method. This was accomplished by calculating the 2.5% error confidence coefficient from a minimum of nine data sets between the CEMS analyzer and Reference Method analyzer.

The Reference Method Analyzer was connected parallel to the CEMS analyzer. Each analyzer had its own sample train and the reference analyzer is calibrated through the entire sample collection systems. The voltage output of the reference analyzer is sent to a strip chart recorder for recording as hard data. The following gas values were used to document calibration of the Reference Method analyzer:

Zero Span Gas	Zero Grade Nitrogen	0.00%
Low Span Gas	Propane/Balance Nitrogen	0.499%
Mid Span Gas	Propane/Balance Nitrogen	1.019%
High Span Gas	Propane/Balance Nitrogen	1.814%

After the reference analyzer was calibrated, the CEMS was placed on-line and nine (9) test runs were performed comparing concentration readings from the CEMS and Reference Method analyzers. Test runs lasted twenty-one minutes during which the VRU received hydrocarbon loading from transport vehicles.

The Method 25B data was then organized into one-minute segments. These data sets were used to calculate the relative accuracy using the formulas contained in 40 CFR, Part 60, Appendix B, Performance Specification 2, and Section 8 on Page 12.

The relative accuracy of the CEMS must be no greater than 20% of the mean value of the reference method test data, or 10 % of the applicable standard to be considered valid.

The following equipment was used during this test:

1. Strip Chart Recorder: Yokogawa Model DX1000n paperless chart recorder
2. VOC Gas Analyzers: Infrared Industries - IR208 NDIR
3. Propane/Methane Calibration Gases - 25 - 35% Full Scale
   45 - 55% Full Scale
   80 - 90% Full Scale
4. Zero Grade Nitrogen Gas

4.2 Sampling procedure or operational variances

Zeeco, Inc. conducted the relative accuracy test audit with no sampling or procedural variations. The VRU and CEMS test operated with no operational variances.