Volatile Organic Compound Emission Test Report
September 11, 2019

Vapor Combustion Unit

Sunoco Partners Marketing & Terminals, LP
500 S Dix Street
Detroit, Michigan 48217

Zeeco Project No. 41322

Zeeco Inc.
11505 Commonwealth Drive
Suite 104
Louisville, Kentucky 40299

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: ____________________ Name of Person Signing: Troy Hardin

Title: Environmental Test Technician Date: 9/30/19

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: 9/30/19

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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 (Sunoco) to complete a performance test of their vapor processing system at their bulk marketing terminal located in River Rouge, Michigan. The facility is a petroleum bulk terminal for loading gasoline and fuel oil products onto tanker trucks. The products are bottom loaded into the tanker trucks and the displaced hydrocarbon vapors are balanced to a Vapor Combustion Unit (VCU). The facility was source tested for air emissions on September 11, 2019. Troy Hardin and Steven Hubbard of Zeeco, Inc. performed the field air emission testing.

1.2 Purpose of Testing

The purpose of this test was to demonstrate compliance with the applicable air emission requirements of the VCU. The Gasoline Terminal Air Emission Source Test was conducted in accordance with procedures established, and the test methods referenced, in the Code of Federal Regulations; CFR 40, Part 60, Subpart XX and CFR 40, Part 63, Subpart BBBBBB.

1.3 Description of Source

Sunoco owns and operates the bulk marketing terminal in River Rouge, Michigan where light petroleum products are bottom loaded at five loading bays. The terminal is equipped to load Regular, Midgrade, Premium Unleaded Gasoline fuel products as well as Diesel fuel and Transmix fuel products onto tanker trucks.

The terminal uses a vapor combustion unit (VCU) to manage VOC emissions from the transport trailers during loading. The loading rack has a vapor collection system to collect and transfer emissions from the loading rack to the VCU. The truck loading rack is equipped with vapor recovery hoses positioned at the transport loading positions for hook up to the vapor collection system. All trucks that load must connect the vapor recovery hose before loading liquid product.

The vapor hoses have individual check valves that prevent unused hoses from leaking vapors to the environment. The vapor pipe manifold connects the vapor hoses to the VCU. The vapor pipe system also employs a liquid condensate accumulator, flame arrester and pressure/vacuum relief valve upstream from the VCU.

1.4 Contact Information

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2.0 SUMMARY OF RESULTS

2.1 Executive Summary

The results of this air emission test demonstrate that this source is in compliance with the applicable Federal and Local requirements. A summary of the data is presented below in Table 2-1.

The Method 21 Leak Test was performed on the day prior to testing. A portable LEL meter was calibrated using a 5000 PPM methane calibration gas. The meter was used to check for leaks around all fittings, flanges, valves as well as any other exposed potential leak source. No leaks were found in excess of 500 ppm.

Table 2-1 - Summary of Results

Regulation	Measured Result	Applicable Limit
40CFR60.503(b) 40CFR63.11092(a)(1)(i)	0ppm	500ppm Subpart BBBBBB
40CFR60.502(h)(i)	Highest Pressure: 9" H_20	18" H_20
40CFR60.502orPermit Limit (Accountable Products)	5.50 mg/L	20 mg/L
40CFR60.503(c)(1)	119,090 Gallons 450,805 Liters	80,000 Gallons 300,000 Liters
40CFR60.503(c)(1)	6 Hrs	Minimum 6 Hrs
Average Inlet Conc.	18.69%	NA
Average Outlet Conc.	14.01ppm	NA
Average CO Conc.	21.93ppm	NA
Average CO2 Conc.	0.52%	NA

3.0 SOURCE DESCRIPTION

3.1 Description of Process

A brief description of the vapor combustion unit (VCU) process is presented below. For a detailed description, please consult the manufacturer's equipment manual.

The VCU consists of the following components:

- Vertical combustion stack with louvers to allow intake of secondary combustion air
- Primary air blower
- Non-flashback burner assembly
- Pilot burner
- Various electric and mechanical controls required for proper and safe operation.

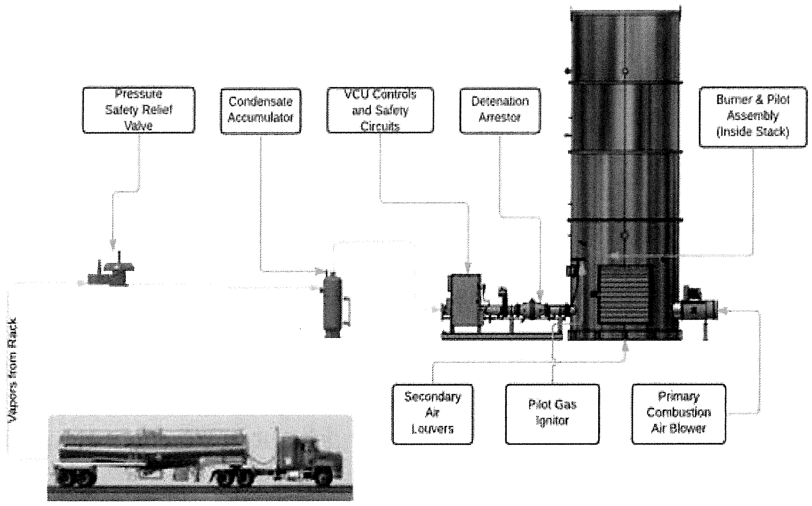
The incoming hydrocarbon vapors from the truck loading facility are mixed with primary combustion air and then ignited by a natural gas (propane) fueled pilot burner. Secondary combustion air is mixed with the combustion products as they continue through the firebox and ultimately vent to the atmosphere at the top of the vertical stack.

The VCU has an interlock to prevent the venting of vapors to the VCU prior to it being in an operating mode. When a tank truck enters the loading rack, a vapor line is attached to the tank truck to move hydrocarbon vapors to the VCU. Before the truck can be loaded, the VCU must provide a signal indicating that it is ready to receive vapors.

When the interlock is satisfied, the VCU turns on and purges the stack with the primary combustion air blower. This step is a safety requirement to remove any residual vapors that may be present in the stack before lighting the pilot. Once the pilot is lit and proven, the VCU returns the required "Ready to Load" signal to the truck load rack. As the truck loads liquid gasoline, the displacement pressure pushes the hydrocarbon vapors from the truck to the VCU for combustion. The vapor pipe contains a small condensate accumulator to prevent any thermal condensation liquid to reach the burner assembly and also a flame arrester for safety. A moderate increase in vapor line pressure opens a flow control valve allowing the vapors to pass to the burner of the VCU.

During the operation of the VCU, the primary combustion air blower introduces fresh air to the hydrocarbon/air vapor mix in front of the burner. The vapors are passed through the burner assembly and oxidized. The VCU stack is sized to contain the vapor combustion zone in which the vapor combustion continues as the combustion products mix with secondary combustion air and vent through the top of the stack.

3.2 Typical Layout of Source



3.3 Type and quantity of materials processed during test

During the Emission Test on September 11, 2019 at the Sunoco terminal in River Rouge, Michigan, a total of 119,090 gallons, or 450,805 liters of gasoline product was loaded. US EPA Title 40 CFR, Part 60, Subpart XX requires a minimum of 80,000 gallons or 300,000 liters of gasoline during the six-hour test.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Description of sampling and field procedures

The following methods were completed as part of the emission test:

- Method 2A and 2B - vapor volume measurement.
- Method 10 – CO concentration
- Method 3A – CO_2 concentration
- Method 21 – System leak detection
- Method 25B – Hydrocarbon concentration

Transport loading pressure was monitored as described in sub-section 60.503 (d) (i.e., 18" water column gauge test). All sampling procedures conformed to procedures outlined in New Source Performance Standards (NSPS), 40 CFR 60, Subpart XX – Section 60.503 – Test Methods and Procedures and Subpart BBBBBB. Specifically, in the field a Dwyer Magnehelic Pressure Gauge was connected to the transport vapor hose connection. Pressure readings were recorded on the truck loading data sheets. All loading bays were tested.

All vapor collection equipment, including fittings, vents and hoses were tested using the Method 21 test. This test is required by 40 CFR 63 Subpart BBBBBB requirements (prior to beginning the test). Any readings equal to or greater than 500 PPM as methane would have been considered a leak and noted and repaired prior to beginning the test. No leaks equal to or greater than 500ppm were found.

Method 21 leak detection testing was conducted on any gasoline truck whose emissions showed obvious signs of leaks using sight, sound, and smell as an indication. In accordance with Subpart BBBBBB, Section 63.110902(a)(1)(i), any leak equal to or greater than 500 ppm vol. methane was considered a leak. Failed transport trucks were classified as a failed leak test and any gasoline volume was removed from accountable gallons.

USEPA method 25B was used to monitor the exhaust VOC measurements from the VCU. The non-dispersive infrared analyzer (NDIR) was calibrated on propane and the full-scale range is 0 - 1,000-PPM volume. Protocol 1 gases were used to calibrate the analyzer. The exhaust VOC sample was collected through a heated sample line that was automatically regulated to 250^{o} F $\pm$ 25^{o}F. This feature prevents any water and soluble VOC condensation in the exhaust sample line.

A non-dispersive infrared analyzer, turbine flow meter, inlet vapor thermistor and inlet pressure transducer were connected to the VCU vapor inlet pipe to collect all test data. Inlet VOC flow meter temperature and pressure are used for standardizing volumes during data reduction.

Method 25B was also used to measure inlet VOC concentration. A continuous sample was taken through non-heated Teflon tubing from the turbine meter to the NDIR analyzer. Primary Standard gases were used to calibrate the inlet VOC analyzer. This analyzer operated on a 0-100% volume propane full-scale range.

Field data was monitored continuously and recorded every 5 minutes for printout as a test data point. The data is captured in a PLC and exported to a Windows compatible laptop computer running Wonderware software. The data monitored over the test period includes time, ambient temperature, inlet meter temperature, barometric temperature, flow meter static pressure, inlet hydrocarbon concentration, exhaust hydrocarbon concentration, exhaust CO and CO_2 concentrations, and inlet flow rate. All of the accumulated data is downloaded into an Excel spreadsheet to calculate:

- standardized inlet flow rate
- calculated exhaust flow rate
- inlet hydrocarbon mass
- exhaust hydrocarbon mass

At the end of testing, an Excel spreadsheet calculates the total mass of hydrocarbons emitted from the VCU during testing. The volume of accountable liters loaded during the test is then used to calculate the mass of hydrocarbons per liter of gasoline loaded. The inlet and exhaust mass of hydrocarbons is also used to calculate the VCU's destruction efficiency.

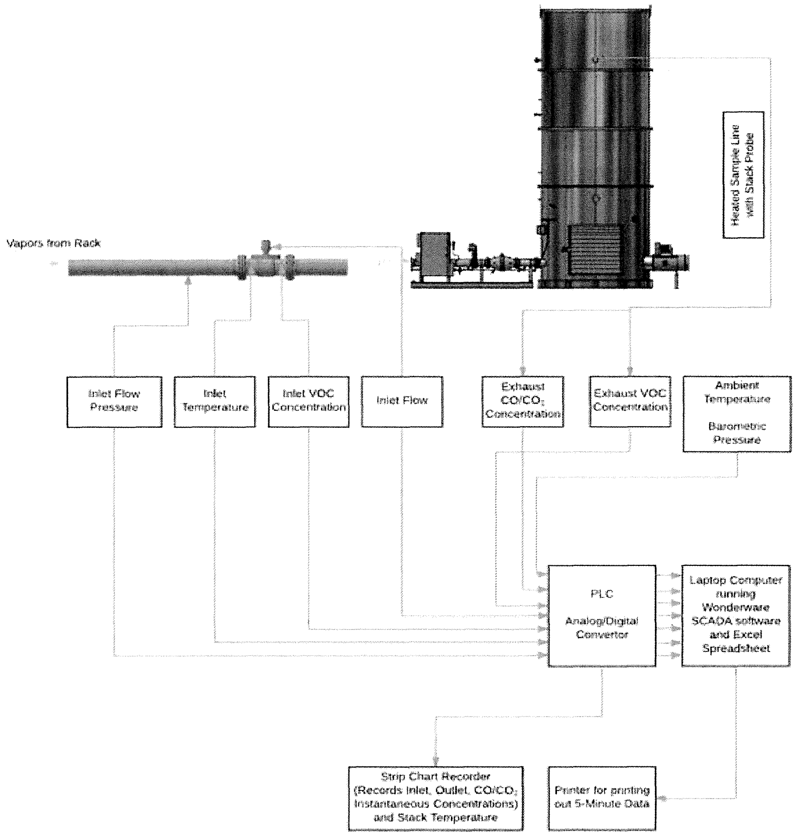
Copies of the transport loading rack sheets, hydrocarbon analyzer strip charts, and computer printouts will be attached as Appendices to the final test report.

Per CFR 40 Part 60 Method 25A Section 8.5 (referenced by Method 25B): response time testing will be performed three times on the measurement system at the calibration valve assembly and the average results will be reported.

The analytical equipment used during the emission test is displayed in Table 4-1 below.

Quantity	Item	Range (if applicable)	Method or Purpose
2	Thermistor Temperature Probes		Turbine Meter Std. Ambient Temp.
1	Allen Bradley PLC		Data Reduction Pkg.
1	RKI Eagle LEL Monitor	5000 ppm	Method 21 Leak Testing
1	Differential Pres. Transducer		Turbine Meter Std.
1	Digital Barometer		Turbine Meter Std.
1	American Meter GTX 8" Turbine Flow Meter	60,000 SCFH	Method 2A
1	Yokogawa 6 Channel Strip Recorder		Data Recorder
1	VOC Gas Analyzer	0-1000 ppm	Exhaust TOC
1	VOC Gas Analyzer	0-100 %	Inlet TOC
1	CO Gas Analyzer	0-1000 ppm	Exhaust CO
1	CO_2 Gas Analyzer	0-10 %	Exhaust CO_2
1	Heated Sample Line	250^{o} F $\pm$ 25^{o} F	Sample Delivery
1	Stack Probe Assembly		Sample Delivery
2	Dwyer Magnehelic Pressure Gauge		40 CFR 60.503 (d)

4.2 Typical Layout of Test Equipment



4.3 Description of Analytical Procedures

Both VOC non-dispersive analyzers were calibrated using propane and nitrogen mixtures of approximately 0%, 25%, 50%, and 85% of full scale. A full calibration was performed immediately prior to the start of the test. During the test, hourly drift checks were performed using the 0% and 50% span gas to document acceptable span and zero drift. All pertinent field calibration data was made available for local onsite test observers.

4.4 Sampling, procedure or operational variances

Zeeco, Inc. conducted the emission test with no sampling or procedural variations. Sampling procedures for Exhaust TOC, Inlet TOC, CO, and CO_2 followed all quality control procedures specified in EPA Method 25B. As specified in US EPA Method 25A, sampling of the exhaust was conducted from the centrally located cross section of the stack. The VCU burned normally with no operational variances.