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May 9, 2019

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US EPA Region 5
Office of Air and Radiation
77 W. Jackson Blvd.
Chicago, IL 60604

Re: Woodhaven Terminal
Permit to Install No. 21-14D

To Whom It May Concern;

On behalf of Buckeye Terminals, LLC (Buckeye), Envirospec Engineering, PLLC is submitting this Emissions Performance Test Report for the Rail Vapor Combustion Unit (VCU2) for the Buckeye Woodhaven Terminal (Terminal), located at 20755 West Road, Woodhaven, MI 48183.

Testing was completed on April 16, 2019.

Should you have any questions please feel free to contact me at 518-453-2203.

Sincerely,

Gianna Aiezza

Gianna M Aiezza, PE
Principal Engineer
Envirospec Engineering, PLLC

cc: Kimberly Trostel – Buckeye (email)

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AIR QUALITY DIVISION



Emissions Performance Test Report

for

Buckeye Terminals, LLC

at the

Woodhaven Loading Terminal in Woodhaven, MI

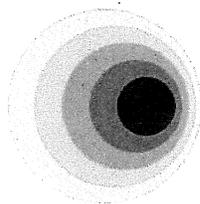
on a

Vapor Combustion Unit (VCU)

subject to

**EPA Title 40 CFR Part 63, Subpart BBBBBB
Michigan DEQ Permit to Install 21-14D**

Prepared for:



BUCKEYE TERMINALS, LLC

**Test Date: April 16, 2019
Erthwrks Project No. 8160**

Endorsement Page

This report was developed in accordance with the requirements designated in the applicable regulatory permit(s) and or regulatory rules. To the best of my knowledge the techniques, instrumentation, and calculations presented in this report will serve to accurately and efficiently detail the results of the test campaign requirements.

Erthwrks, Inc.

Name: Luke Morrison

Title: Project Manager

Signature: 

This report has been reviewed for accuracy and completeness. The actions presented in this report are, to the best of my knowledge, an accurate representation of the results and findings of the test campaign.

Erthwrks, Inc.

Name: John Wood

Title: Senior Partner

Signature: 

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1.0 INTRODUCTION

1.1 Identification, location and dates of tests

One John Zink Vapor Combustor Unit (VCU) was tested for Buckeye Terminals, LLC at their Woodhaven Loading Terminal in Woodhaven, MI. The emission testing was conducted on April 16, 2019.

Table 1: Facility Unit Information

Unit	Make	Model
VCU2	John Zink	ZCT-3-9-50-3-3/6-3/6-X-X

1.2 Purpose of Testing

The purpose of the test was to determine the collection and destruction efficiency of the VCU system associated with the rail loading rack. The testing was conducted in accordance with the conditions in Title 40 Code of Federal Regulations (CFR) Part 63, Subpart BBBB, 40 CFR 60, Subpart XX, and the Michigan DEQ Permit to Install 21-14D.

Testing was conducted for the determination of Total Organic Compounds (TOC) mass emission rate. Exhaust Carbon Dioxide (CO₂) and Carbon Monoxide (CO) concentrations were also measured to calculate exhaust flow rate.

1.3 Description of Source

Buckeye Terminals, LLC owns and operates the Woodhaven Loading Terminal in Woodhaven, MI. This bulk fuel terminal is designed to receive, store, and deliver fuel to rail cars. Within this facility, the VCU, in conjunction with all components of the vapor collection system, is in place in order to minimize the emissions of TOC during the loading of rail cars.

The VCU is manufactured by John Zink. The emissions are vented to the atmosphere from an exhaust stack approximately 35 feet above ground level. The unit is in operation only while rail cars are being loaded and vapors are entering the combustion zone. When this occurs, the combustion products will include hydrocarbons, carbon monoxide, and carbon dioxide.

1.4 Contact Information

Buckeye Terminals, LLC

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Erthwrks Inc.

Luke Morrison
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Facility Location:

Woodhaven Loading Terminal
20755 West Road
Woodhaven, Michigan

2.0 SUMMARY OF RESULTS

Results of the stack testing on the VCU are summarized in Table 2. The sampling results indicate the facility is in compliance with the limits set forth in the 40 CFR 63 Subpart BBBBBB, 40 CFR 60 Subpart XX, and Michigan DEQ Permit to Install 21-14D.

Table 2: Summary of Results

Test Parameter	Measured Results	Applicable Limit
Method 21—Vapor Leak	130 ppm	500 ppm §63.11092(a)(1)(i)
Rack Back Pressure	<0	<0 mmH ₂ O Michigan DEQ Permit to Install 21-14D
TOC Emissions	0.00 mg/Liters loaded	6 mg/Liters loaded Michigan DEQ Permit to Install 21-14D
Volume Loaded	337,660 Liters of Gasoline	300,000 Liters of Gasoline §63.11092(a)(1)
Compliance Test Time	>6 hours	Minimum 6 hours §63.11092(a)(1)

3.0 SOURCE DESCRIPTION

3.1 Description of the process

This bulk fuel terminal is designed to receive, store, and deliver fuel to rail cars. Within this facility, the VCU operates in conjunction with all components of the vapor collection system in order to minimize the emissions of TOC during the loading of rail cars.

As rail car loading is being performed at the loading rack, gasoline products are transferred from the storage tanks into the rail cars. The cars are loaded with product at approximately 500-600 gallons per minute per loading arm. As gasoline product is loaded into the vessels, the head-space inside the vessel, which contains gasoline vapors, are vented into the vapor collection system. This system includes vapor hoses that connect the rail cars to the vapor collection system piping. The piping then vents the vapors, through various valves and flame arrestors, to the VCU. At the VCU, the hydrocarbon vapors are destroyed and the combustion products are vented to the atmosphere through the VCU emission stack.

3.2 Applicable permit and source designation

The Buckeye Terminals, LLC Woodhaven Loading Terminal is subject to the regulations set forth in the Michigan DEQ Permit to Install 21-14D, 40 CFR 60, Subpart XX, and 40 CFR 63, Subpart BBBBBB.

3.3 Type and quantity of materials processed during tests

During the emission testing on April 16, 2019 of the Woodhaven Loading Terminal, 89,210 gallons, or 337,660 liters of gasoline product was loaded during the six-hour test period. **US EPA Title 40 CFR, Part 60, Subpart XX §60.503 (c)(1)** requires a minimum of 300,000 liters of gasoline during a six-hour period.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

4.1 Description of sampling and field procedures

Erthwrks Inc. conducted the VCU emission test following all procedures set forth in the US EPA 40 CFR 63, Subpart BBBB. As specified by this performance standard, Erthwrks utilized the following methods for the emission rate determination:

- EPA Method 2A for VCU inlet flow rate
- EPA Method 2B for VCU exhaust flow rate
- EPA Method 3A for CO₂ concentration
- EPA Method 10 for CO concentration
- EPA Method 21 for VCU leak checks
- EPA Method 25B for TOC inlet concentration
- EPA Method 25A for TOC exhaust concentration

Erthwrks Inc. utilized a mobile laboratory on site to conduct the emission testing. The Method 21 leak determination was conducted utilizing an RKI Eagle™ portable gas detector. This test was conducted at the beginning of the test period when rail cars began loading. This analyzer employs a strong sample pump and meets all quality assurance specifications required by the method. Vapor at all potential leak sources in the terminal's vapor collection system were monitored while trucks were being loaded.

The rack back pressure determination was conducted using Testo 510i Bluetooth digital manometers. These manometers were installed between the truck and the vapor collection hose utilizing leak-tight adapting connections. Every loading position was tested at least once during the performance test as specified in US EPA 40 CFR 60 Subpart XX §60.503 (d)(2).

Inlet TOC concentration and flow rates were measured utilizing an American® turbine meter and an inlet sample system designed to continuously monitor the gas TOC concentration upstream of the VCU. The inlet flow rate determination was conducted following all procedures and quality assurance as specified by Method 2A. The calibrated turbine meter, also known as an inferential meter, utilizes a rotor in the gas stream that turns at a speed proportional to the flow rate of the gas. This gas flow and the meter's temperature and static pressure were monitored and recorded on Erthwrks' data logging system. This data, along with the inlet TOC concentration measured with a Horiba NDIR Hydrocarbon Analyzer following all procedures set forth in Method 25B, allowed Erthwrks to determine the TOC mass flow rate to the VCU.

TOC emission rates were quantified using the procedures set forth in Subpart XX along with the other methods listed above. Utilizing US EPA Method 2B (Eq. 2B-1), in conjunction with US EPA Methods 3A and 10 for CO₂ and CO concentrations, exhaust flow rate was determined. TOC exhaust emissions were determined utilizing a sample system as specified by Method 25A. Sample was extracted from the exhaust stack through a heated sample line and analyzed with a CAI® FID Hydrocarbon Analyzer following all procedures and equipment set forth in the method. Using this TOC concentration, the exhaust flow rate, the density factor for the

calibration gas given in **US EPA 40 CFR 60 Subpart XX §60.503(c)(3)**, and the loading terminal bills of ladings, Erthwrks calculated the TOC emission rate in mg of total TOC per liters of gasoline loaded.

4.2 Description of Analytical Procedures (QAQC)

The TOC concentration determination followed all QAQC procedures as specified in the US EPA 40 **CFR 60**, Appendix A, Method 25A. The calibration error (CE) test was conducted following the procedures specified in **EPA Method 25A §8.4**. In accordance with this requirement, a four-point analyzer calibration error test was conducted prior to exhaust sampling. This CE test was conducted by introducing the zero, low, mid, and high-level calibration gases (as defined by EPA Method 25A §7.1.2-5 and the response was recorded. The results of the CE test are acceptable if the responses for the low and mid-level calibration gasses are within $\pm 5.0\%$ of the predicted responses. The sample system response time was also recorded.

After each compliance test run, the drift determination was conducted to validate the run data in accordance with **EPA Method 25A §8.6.2**. The run data is valid if the calculated drift is within $\pm 3.0\%$ of the span value (**EPA Method 25A §13.1.2**)

Table 3: Analytical Instrumentation

Effluent Tested	Analyzer Make/Model	Range	Detection Principle
Inlet TOC	Horiba VIA-510	60%	Non-Dispersive Infrared (NDIR)
Exhaust TOC	CAI Model 600	1000 ppm	Flame Ionization Detector (FID)
CO	Teledyne Model 300EM	1000 ppm	Non-Dispersive Infrared (NDIR)
CO ₂	Teledyne Model 300EM	10 %	Non-Dispersive Infrared (NDIR)
Turbine Meter	American 8" GTX	60,000 SCFH	N/A

All supporting documentation used to quantify the results of this emission test is attached. The detailed results of emissions test are located in Appendix A. These detailed results include all the 5-min average results from Erthwrks' data logging system converted into the proper units and also includes the calculations for the formulation of the results. Erthwrks quality control documentation is found in Appendix B. This documentation demonstrates the gaseous analyzers meet all the QA/QC specifications of the method. Appendix C contains all example calculations used to formulate the emission test results. The Erthwrks Sample System Diagram and the field data sheets used are located in Appendix D. Appendix E contains the raw data log records. These records show the 1-min average record of all data collected on Erthwrks' data logging system while the 5-min average records are located in Appendix F. All calibrations and certifications

can be found in Appendix G. Appendix H contains the bills of ladings that document the total gasoline loaded during the testing period.

4.3 Discussion of sampling procedures or operational variances

For consistency, the gaseous procedures for the determination CO₂ and CO followed all quality control procedures specified in EPA Method 25A. A stratification test was not conducted for EPA Methods 3A and 10 as stratification was not expected due to the mechanical construction of the combustion zone and the exhaust stack. Conducting a representative stratification test on a unit with a constantly dynamic combustion zone is not possible. As specified in section **US EPA Method 25A §6.1.2**, sampling of the exhaust was conducted from the centrally located 10 percent area of the stack cross-section of the stack.

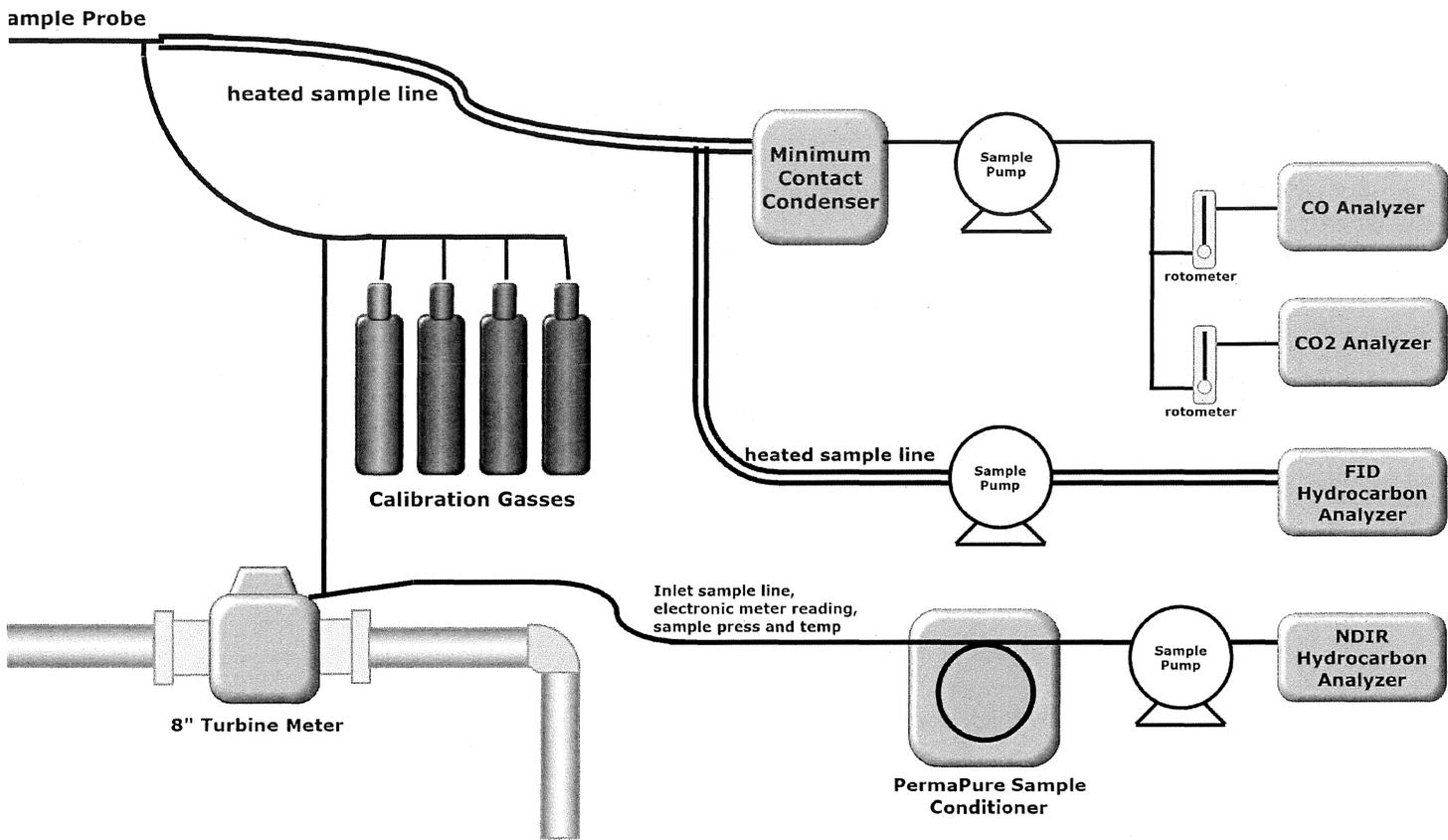


Figure 1: Sample System Diagram