Report of...

VOC Destruction Efficiency Testing

Performed for...

Atlas EPS
A Division of Atlas Roofing
Byron Center, Michigan

On the...

Thermal Oxidizer

March 23, 2017

259.03

By...

Network Environmental, Inc.
Grand Rapids, MI

I. INTRODUCTION

Network Environmental, Inc. was retained by Atlas EPS (a division of Atlas Roofing) to conduct VOC (total hydrocarbons) emission sampling at their Byron Center, MI facility. The purpose of the study was to document compliance with MDEQ Air Quality Division Renewable Operating Permit (ROP) No. MI-ROP-N1794-2017. MI-ROP-N1794-2017 has established a 95% destruction efficiency (DE) limit for the thermal oxidizer at this facility.

The DE of the thermal oxidizer was determined by employing the following reference test methods:

- VOC's – U.S. EPA Method 25A
- Exhaust Gas Parameters (air flow rate, temperature, moisture & density) – U.S. EPA Reference Methods 1 through 4.

The sampling was performed on March 23, 2017 by Stephan K. Byrd and David D. Engelhardt of Network Environmental, Inc.. Assisting in the study were Mr. Jon Nelson of Atlas EPS and the operating staff of the facility. Ms. Kaitlyn DeVries and Mr. Jeremy Howe of the Michigan Department of Environmental Quality (MDEQ) – Air Quality Division were present to observe the sampling and source operation.

II.1 TABLE 1
VOC DESTRUCTION EFFICIENCY (DE) RESULTS
THERMAL OXIDIZER
ATLAS EPS
BYRON CENTER, MICHIGAN
MARCH 23, 2017

Sample	Time	Air Flow Rate SCFM (1)		Concentration PPM (2)		Mass Emission Rate Lbs/Hr (3)		Percent Destruction Efficiency (4)
		Inlet	Exhaust	Inlet	Exhaust	Inlet	Exhaust	
1	09:13-10:13	2,410	4,399	2,401.4	9.1	39.54	0.27	99.32
2	10:45-11:45	2,419	4,406	1,989.8	6.1	32.89	0.18	99.45
3	12:39-13:39	2,301	4,244	2,093.6	12.3	32.92	0.36	98.91
Average		**2,377**	**4,350**	**2,161.6**	**9.2**	**35.12**	**0.27**	**99.23**

(1) SCFM = Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
(2) PPM = Parts Per Million (v/v) On An Actual (Wet) Basis As Propane
(3) Lbs/Hr = Pounds Per Hour Calculated As Propane
(4) Destruction Efficiencies were calculated using the mass emission rates (Lbs/Hr)

III. DISCUSSION OF RESULTS

The results of the emission sampling are summarized in Table 1. The results are presented as follows:

III.1 Total Hydrocarbon (VOC) Destruction Efficiency Results (Table 1)

Table 1 summarizes the VOC DE results for the thermal oxidizer as follows:

- Sample
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- VOC Concentrations (PPM) – Parts Per Million (v/v) On An Actual (Wet) Basis As Propane
- VOC Mass Emission Rates (Lbs/Hr) – Pounds Of VOC Per Hour As Propane
- VOC Percent Destruction Efficiency (DE) (Calculated using the mass emission rates)

Both the inlet and exhaust air flow rates, VOC concentrations and VOC mass rates are shown.

Process operating information during the testing can be found in Appendix F.

IV. SAMPLING AND ANALYTICAL PROTOCOL

The exhaust sampling was conducted on the 18 inch I.D. exhaust stack at a location that exceeds eight (8) duct diameters downstream and two (2) duct diameters upstream from the nearest disturbances. The inlet sampling was conducted on the 18 inch I.D. inlet duct at a location approximately four (4) duct diameters downstream and two (2) duct diameters upstream from the nearest disturbances.

IV.1 Total Hydrocarbon (VOC) – The VOC sampling was conducted in accordance with U.S. EPA Method 25A. J.U.M. Model 3-500 flame ionization detector (FID) analyzers were used to monitor the inlet and exhaust. Heated teflon sample lines were used to transport the gases to the analyzers. These analyzers produce instantaneous readouts of the total hydrocarbon concentrations (PPM).

The analyzers were calibrated by system injection (from the back of the stack probe to the analyzer) prior to the testing using propane calibration gases. Span gases of 15,200 PPM (inlet) and 453.7 PPM (exhaust) were used to establish the initial instrument calibrations. Calibration gases of 8,460 PPM & 4,008 PPM (for

the inlet) and 247.1 PPM, 151.1 PPM, 96.49 PPM, 50.19 PPM & 29.17 PPM (for the exhaust) propane were used to determine the calibration error of the analyzers. After each sample, a system zero and system injection of 4,008 PPM (for the inlet) and 29.17 PPM (for the exhaust) propane were performed to establish system drift and system bias during the test period. All calibration gases used were EPA Protocol Calibration Gases. Three (3) samples were collected simultaneously from the inlet and exhaust. Each sample was sixty (60) minutes in duration.

The analyzers were calibrated to the output of the data acquisition system (DAS) used to collect the data from the sources. The analyzer averages were corrected for calibration error and drift using formula EQ.7E-5 from 40 CFR Part 60, Appendix A, Method 7E. Figure 1 is a diagram of the VOC sampling train.

IV.2 Exhaust Gas Parameters – The exhaust gas parameters (air flow rate, temperature, moisture and density) were determined in conjunction with the other sampling by employing U.S. EPA Methods 1 through 4. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

Three (3) velocity traverses (at each sample location) were conducted. Moisture was determined for each velocity traverse by employing the wet bulb/dry bulb technique. Also, a grab bag sample was collected at each location and analyzed by Orsat to determine the oxygen (O_2) and carbon dioxide (CO_2) content.

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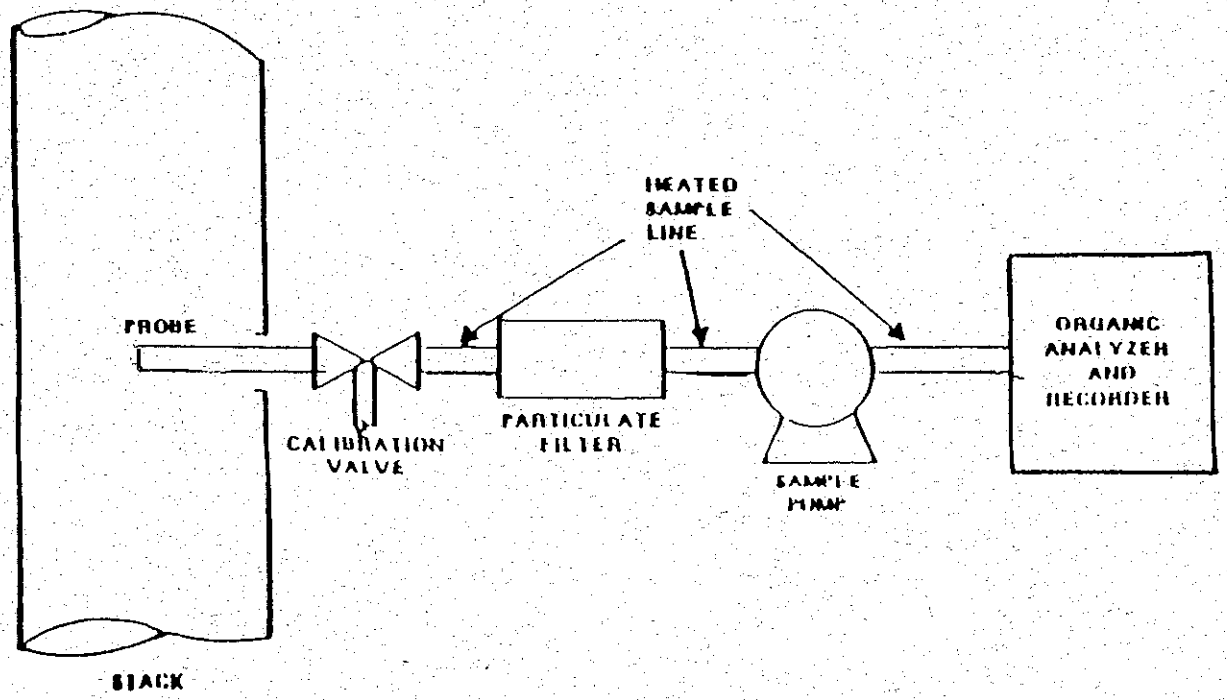

Figure 1

VOC Sampling Train