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I. INTRODUCTION

Network Environmental, Inc. was retained by Hutchinson Antivibration Systems of Cadillac, Michigan (SRN: A9364) to conduct VOC (total hydrocarbons) sampling at their facility. The purpose of the study was to determine the VOC Destruction Efficiency (DE) of the Regenerative Thermal Oxidizer (FGRTO) in order to meet the testing requirements of EGLE Air Quality Division Renewable Operating Permit (ROP) No. MI-ROP-A9364-2022. MI-ROP-A9364-2022 has established a 95% destruction efficiency (DE) limit for the RTO.

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 July 11, 2023 by R. Scott Cargill and David D. Engelhardt of Network Environmental, Inc.. Assisting in the study were Mr. Kevin Schwab of Hutchinson Antivibration Systems and the operating staff of the facility. Mr. Robert Dickman and Mr. Daniel J. Droste of the Michigan Department of Environment, Great Lakes and Energy (EGLE) – Air Quality Division were present to observe the sampling and source operation.

II.1 TABLE 1
VOC DESTRUCTION EFFICIENCY (DE) RESULTS
RTO
HUTCHINSON ANTIVIBRATION SYSTEMS
CADILLAC, MICHIGAN
JULY 11, 2023

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	08:42-09:42	9,612	8,251	1,181.1	34.5	77.57	1.95	97.49
2	10:13-11:13	9,174	8,286	1,570.8	42.1	98.46	2.38	97.58
3	11:44-12:44	8,954	8,075	1,525.8	41.3	93.35	2.28	97.56
Average		**9,247**	**8,204**	**1,425.9**	**39.3**	**89.79**	**2.20**	**97.54**

(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 concentrations and mass rates are shown.

IV. SOURCE DESCRIPTION

Two (2) automatic dip spin lines, four (4) automated chain-on-edge lines, a turbo spray line, and a roll coater are used to coat metal and plastic parts. The VOC emissions from these eight (8) lines are controlled by a permanent total enclosure and common regenerative thermal oxidizer (FGRTO) (MI-ROP-A9364-2022).

V. SAMPLING AND ANALYTICAL PROTOCOL

The exhaust sampling was conducted on the 26 inch I.D. exhaust stack at a location approximately fifteen (15) duct diameters downstream and approximately five (5) duct diameters upstream from the nearest disturbances. The inlet sampling was conducted on the 26 inch I.D. inlet duct at a location approximately eight (8) duct diameters downstream and approximately five (5) duct diameters upstream from the nearest disturbances.

V.1 Total Hydrocarbon (VOC) – The VOC sampling was conducted in accordance with U.S. EPA Method 25A. A J.U.M. Model 3-500 flame ionization detector (FID) analyzer was used to monitor the exhaust. A Thermo Environmental, Inc. Model 51 flame ionization detector (FID) analyzer was used to

monitor the inlet. 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 4,008 PPM (inlet) and 95.0 PPM (exhaust) were used to establish the initial instrument calibrations. Calibration gases of 2000 PPM & 991 PPM (for the inlet) and 50.6 PPM & 29.9 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 991 PPM (for the inlet) and 29.9 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.

V.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 and analyzed by Orsat to determine the oxygen (O_2) and carbon dioxide (CO_2) content at each location.

This report was prepared by:

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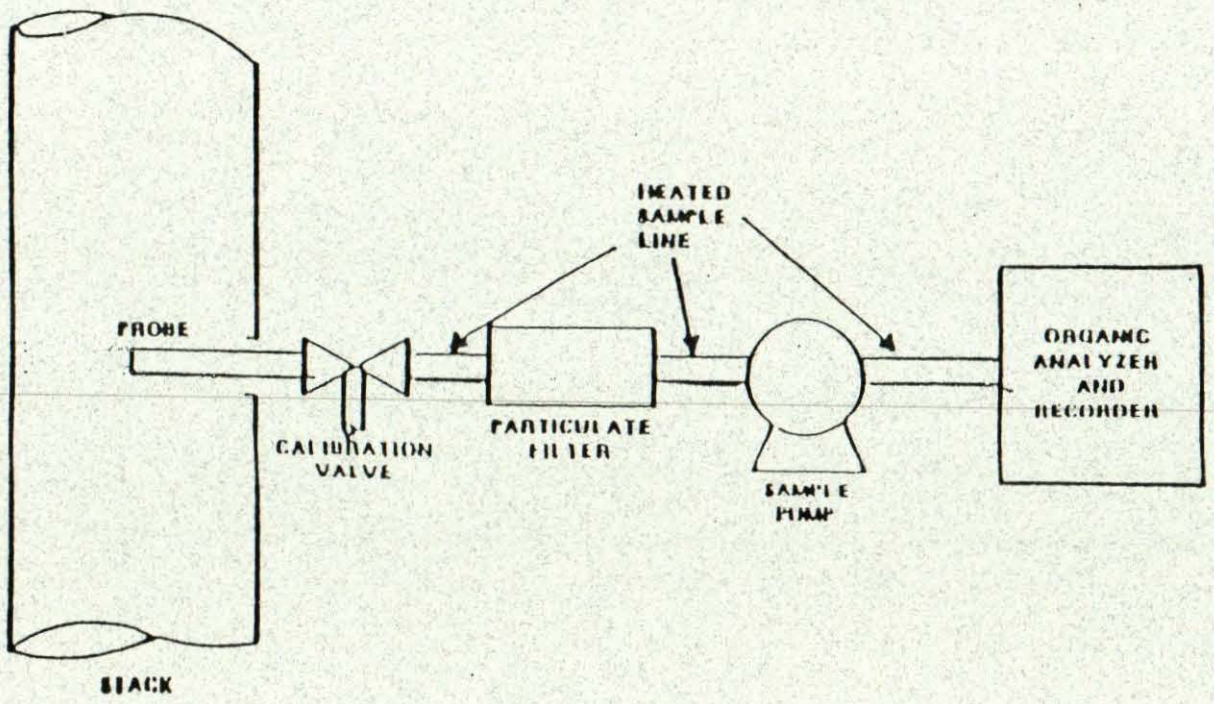

Figure 1

VOC
Sampling Train