I. INTRODUCTION

Network Environmental, Inc. was retained by Albar Industries, Inc. to conduct VOC (total hydrocarbons) emission sampling at their facility located in Lapeer, MI. The purpose of the study was to meet a request for testing by the EGLE Air Quality Division. The source tested was the RTO (Regenerative Thermal Oxidizer) on Coating Line #3. This source is regulated under EGLE ROP No. MI-ROP-N0802-2020. The destruction efficiency (DE) of the RTO was determined.

The sampling was conducted 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 15, 2022 by Stephan K. Byrd, Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc.. Assisting in the study were Mr. Andrew L. Woodruff of Albar Industries, Inc. and the operating staff of the facility. Ms. Lindsey Wells of the Michigan Department of Environment, Great Lakes and Energy (EGLE) – Air Quality Division was present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

II.1 TABLE 1
VOC DESTRUCTION EFFICIENCY (DE) RESULTS
RTO
ALBAR INDUSTRIES, INC.
LAPEER, MICHIGAN
MARCH 15, 2022

Sample	Time	Air Flow Rate SCFM (1)		VOC Concentration PPM (2)		VOC Mass Emission Rate Lbs/Hr (3)		Percent Destruction Efficiency (4)
		Inlet	Exhaust	Inlet	Exhaust	Inlet	Exhaust	
1	13:15-14:15	4,346	4,492	1,431.7	44.0	42.52	1.35	96.83
2(5)	14:48-15:57	4,596	4,680	1,796.8	51.9	56.43	1.66	97.06
3	17:03-18:03	4,683	4,720	1,581.4	46.4	50.60	1.50	97.04
Average		**4,542**	**4,631**	**1,603.3**	**47.4**	**49.85**	**1.50**	**96.98**

(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 As Propane
(4) Destruction Efficiencies (DE) were calculated using the mass emission rates (Lbs/Hr)
(5) Sample 2 was suspended at 15:36 because the coating line went down. Testing was resumed at 15:46. Total actual sampling time was 60 minutes (same as the other two samples).

III. DISCUSSION OF RESULTS

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

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

Table 1 summarizes the VOC DE results for the thermal oxidizer (RTO) 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. The DE results were calculated using the mass emission rates (Lbs/Hr).

IV. SOURCE DESCRIPTION

The source sampled was the regenerative thermal oxidizer (RTO). The RTO controls emissions from the flash off areas, the ovens and the Concentrator. The Concentrator controls emissions from the Base Coat Booths on Coating Line #3.

The RTO is manufactured by Huntington Energy Systems, Inc. and is rated to handle 10,000 SCFM.

The Carbon Adsorber collects VOC emissions from the base coat booths on Line #3. The adsorber is designed to handle 30,000 CFM of exhaust. The gases enter the adsorber at the bottom and pass through fluidized trays of carbon granules that collect the VOC's in the exhaust gas and then exit at the top. The cabon travels over the trays from the top of the adsorber to the bottom. When the carbon reaches the bottom of the adsorber, it is transported to the desorber, where it is desorbed using heat from the RTO. After the carbon is desorbed, it is transported back to the adsorber, where it enters at the top.

Plastic automotive parts are coated on Line #3. The parts are conveyed through a washer and a dryoff oven. The parts then enter the first of four paint booths where the parts are manually coated, pass through a flash off area and then into the next booth. After leaving the fourth booth and flash off area, the parts are conveyed into a bake oven where they spend approximately thirty minutes. The exhaust of the ovens and flash off areas are ducted to the RTO for VOC control.

The parts coated and coatings applied during the testing were considered normal operation for the coating line. Source operating data during the testing can be found in Appendix F.

V. SAMPLING AND ANALYTICAL PROTOCOL

The RTO exhaust sampling was conducted on the 32 inch I.D. exhaust stack at a location approximately six (6) duct diameters downstream and approximately one (1) duct diameter upstream from the nearest disturbances. The RTO inlet sampling was conducted on the 28 inch I.D. inlet duct at a location greater than eight (8) duct diameters downstream and two (2) duct diameters upstream from the nearest disturbances.

The sampling was conducted 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.

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 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 2019.0 (RTO inlet) and 94.9 PPM (RTO exhaust) were used to establish the initial instrument calibrations. Calibration gases of 991.0 PPM & 491.0 PPM (for the inlet) and 50.6 PPM & 30.2 PPM (for the RTO exhaust) propane were used to determine the calibration error of the analyzers. After each sample, a system zero and system injection of 991.0 PPM (for

the RTO inlet) and 50.6 PPM (for the RTO exhaust) propane were performed to establish system drift during the test period. All calibration gases used were EPA Protocol Calibration Gases. Three (3) samples were collected simultaneously from the inlet and exhaust of the unit. 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, grab bag samples were collected on the RTO exhaust and analyzed by Orsat to determine the oxygen (O_2) and carbon dioxide (CO_2) content.

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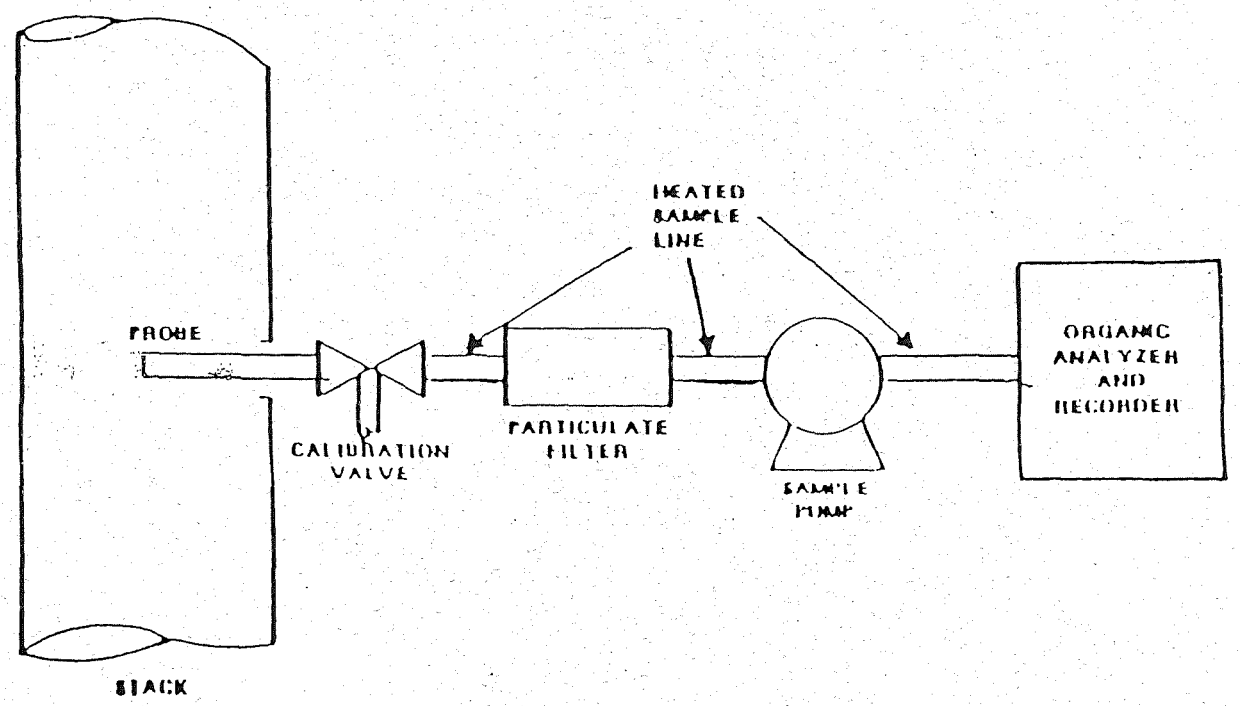

Figure 1

VOC
Sampling Train