I. INTRODUCTION

Network Environmental, Inc. was retained by Albar Industries of Lapeer, Michigan to conduct a ROP Compliance test on coating Line #3. The purpose of the study was to determine the VOC Control Efficiency of the RTO and Concentrator on Coating Line #3 in accordance with their ROP# MI-ROP-N0802-2020 and 40CFR, Part 63, Subpart PPPP.

The testing was conducted on June 15 & 16, and November 23, 2021 by Stephan K. Byrd, Richard Eerdmans and David D. Engelhardt of Network Environmental, Inc. The testing was performed in accordance with EPA Reference Methods 204 and 25A. Exhaust Gas Parameters were quantified using EPA Reference Methods 1-4. Assisting with the study was Mr. Andrew Woodruff of Albar Industries. Ms. Lindsey Wells and Mr. Robert Byrnes, of the EGLE Air Quality Division, were present to observe the testing and source operation.

II. PRESENTATION OF RESULTS

II.1 TABLE 1
VOC DESTRUCTION EFFICIENCY RESULTS (as Propane)
ALBAR INDUSTRIES, INC.
RTO
LAPEER, MICHIGAN
NOVEMBER 23, 2021

Sample	Time	Concentration PPM(1)			Mass Emission Rate Lbs./Hr			%(2) Destruction Efficiency
		Inlet	THC Exhaust	CH4	Inlet	THC Exhaust	CH4	
1	10:27-11:27	332.9	56.8	51.8	11.28	1.92	0.62	88.44
2	11:48-12:48	338.7	66.4	52.2	11.00	2.38	0.64	84.17
3	13:08-14:08	334.6	71.4	51.6	11.11	2.49	0.61	83.12
Average		**335.4**	**64.9**	**51.9**	**11.13**	**2.26**	**0.62**	**85.24**

(1) PPM = Parts Per Million (v/v) on an actual (wet) basis
(2) Destruction Efficiencies were calculated using the mass emission rates subtracting the methane fraction on the exhaust

II.2 TABLE 2
VOC CAPTURE EFFICIENCY RESULTS (as Propane)
ALBAR INDUSTRIES, INC.
COATING LINE #3
LAPEER, MICHIGAN
JUNE 16, 2021

Run #	Time	Clear Coat Booth PPH	RTO Inlet PPH	Concentrator Inlet PPH	CE[(1)]
1	08:53-13:03	15.05	10.23	41.44	77.45
2	13:27-17:01	9.66	9.73	42.80	84.47
3	17:17-20:40	13.47	9.77	55.05	82.79
Average		**12.73**	**9.91**	**46.43**	**81.57**

(1) CE = Capture Efficiencies were calculated using the mass emission rates.

II.3 TABLE 3
VOC COLLECTION EFFICIENCY RESULTS (as Propane)
ALBAR INDUSTRIES, INC.
CONCENTRATOR
LAPEER, MICHIGAN
JUNE 15, 2021

Sample	Time	Concentration PPM[1]		Mass Emission Rate Lbs./Hr[2]		%[3] Collection Efficiency
		Inlet	Exhaust	Inlet	Exhaust	
1	09:29-10:29	145.6	84.4	13.09	3.68	71.87
2	11:09-12:09	220.5	80.7	25.83	3.18	87.71
3	12:58-13:58	285.9	103.1	32.38	4.21	87.00
4	14:27-15:27	274.1	96.5	32.41	4.21	87.01
Average		**231.5**	**91.2**	**25.93**	**3.82**	**83.40**

(1) PPM = Parts Per Million (v/v) on an actual (wet) basis
(2) Lbs./Hr = Pounds per hour minus methane
(3) Collection Efficiencies were calculated using the mass emission rates

III. DISCUSSION OF RESULTS

RTO Destruction Efficiency -

The results of the destruction efficiency sampling for the RTO are presented in Section II, Table 1. The destruction efficiency was calculated using the mass loading rates at the inlet and outlet of the RTO, as propane, minus the Methane fraction on the outlet. Flow rate measurements were taken during each test run, and were used to calculate each mass loading rate at the inlet and outlet.

The destruction efficiencies for the three samples taken were 88.44% for sample one, 84.17% for sample two and 83.12% for sample three. The average of the three samples was 85.24%.

Capture Efficiency -

The results of the capture efficiency testing for Coating Line #3 can be found in Section II, Table 2. Calculations were performed using the mass loadings at the Clear Coat Booth exhausts, the RTO inlet and Concentrator inlet as propane.

The capture efficiencies for the three samples taken were 77.45% for run one, 84.47% for run two and 82.79% for run three. The average of the three samples was 81.57%.

Concentrator Collection Efficiency -

The results of the collection efficiency sampling for the Concentrator are presented in Section II, Table 3. The collection efficiency was calculated using the mass loading rates at the inlet and outlet of the Concentrator, as propane. Flow rate measurements were taken on the inlet during each test run, and were used to calculate each mass loading rate at the inlet and outlet. Four samples were collected due to production proplems during the first run.

The collection efficiencies for the four samples taken were 71.87% for sample one, 87.71% for sample two, 87.00% for sample three and 87.01% for sample four. The average of the four samples was 83.40%.

IV. SOURCE DESCRIPTION

The sources sampled were the regenerative thermal oxidizer (RTO) and the Concentrator. 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 VOCs in the exhaust gas and then exit at the top. The carbon 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.

V. SAMPLING AND ANALYTICAL PROTOCOL

The RTO exhaust sampling was conducted on the 32-inch I.D. exhaust stack at a location approximately 6 duct diameters downstream and 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 duct diameters

downstream and two duct diameters upstream from the nearest disturbances. The Carbon Adsorber was sampled on the inlet and outlet, but velocity traverses were only performed on the inlet. The inlet duct to the adsorber was 48-inch I.D. and the test location was greater than eight duct diameters downstream from the nearest disturbance and greater than two duct diameters upstream from the nearest disturbance. The three exhausts from the Clear Coat Booth were each 48-inch I.D. and had approximately six duct diameters downstream from the neatest disturbance and greater than two duct diameters from the exit.

The following reference test methods were employed to conduct the sampling:

* Destruction and Collection Efficiency - U.S. EPA Method 25A
* Capture Efficiency – U.S. EPA Method 204
* Exhaust Gas Parameters (flowrate, temperature, moisture and density) - U.S. EPA Methods 1 - 4

V.1 Destruction, Collection Efficiency and Capture efficiency - The total hydrocarbon (VOC) sampling was conducted in accordance with U.S. EPA Reference Method 25A. The sample gas was extracted from the sources through heated Teflon sample lines, which led to a Thermo Environmental Model 51, a J.U.M Model 3-500 and a J.U.M. 109L portable flame ionization detectors (FIDs). These analyzers produce instantaneous readouts of the total hydrocarbon concentrations (PPM). The 109L contains a methane cutter to determine the methane fraction in the exhaust. Three (3) samples were collected from each of the sources. Samples collected for the destruction efficiency and collection efficiency were sixty (60) minutes in duration. The sampling on the inlet and exhaust of the RTO and Concentrator were conducted simultaneously. Capture Efficiency samples were sixty minutes in duration. Nine sixty minute samples were collected for capture efficiency. Samples were collected at the inlet to the RTO, the inlet of the Concentrator and the exhausts of the Clear Coat Booth. The Clear Coat Booth has three (3) exhaust stacks. Each stack was sampled for twenty minutes during each sixty minute period. Three twenty minute periods, for each stack, collected during each three hour period were averaged to make up each of three sixty minute periods for the three clear coat stacks.

A systems (from the back of the stack probe to the analyzer) calibration was conducted for the analyzers prior to the testing. Span gases of 94.9 PPM, 491.0 PPM, 991.0 PPM propane and 253.0 PPM Methane were used to establish the initial instrument calibration for the analyzers. Propane calibration gases of 30.2 PPM, 50.6 PPM, 152.0 PPM, and 250.0 PPM and 45.1 PPM and 149.0 PPM

Methane were used to determine the calibration error of the analyzers. After each sample (60 minute sample period), a system zero and system injections of 30.2, 152.0, 250.0 and 491.0 PPM propane and 45.1 PPM Methane were performed to establish system drift of analyzers during the test period. All calibration gases used were EPA Protocol 1 Certified. All the results were calibration corrected using Equation 7E-1 from U.S. EPA Method 7E.

The analyzers were calibrated to the output of the data acquisition system (DAS) used to collect the data from the RTO, Concentrator and Clear Coat Booth. All quality assurance and quality control requirements specified in the method were incorporated in the performance of this determination. A diagram of the sampling train is shown in Figure 1.

V.2 Exhaust Gas Parameters - The exhaust gas parameters (airflow rate, temperature, moisture and density) were determined in conjunction with the other sampling by employing U.S. EPA Reference Methods 1 through 4. Velocity traverses were performed during each DE, CE and Collection Efficiency test run. Moisture was determined by employing the wet bulb/dry bulb measurement technique. Oxygen and carbon dioxide concentrations (%) were determined by collecting a bag sample (grab sample) and Orsat analysis. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

This report was prepared by:

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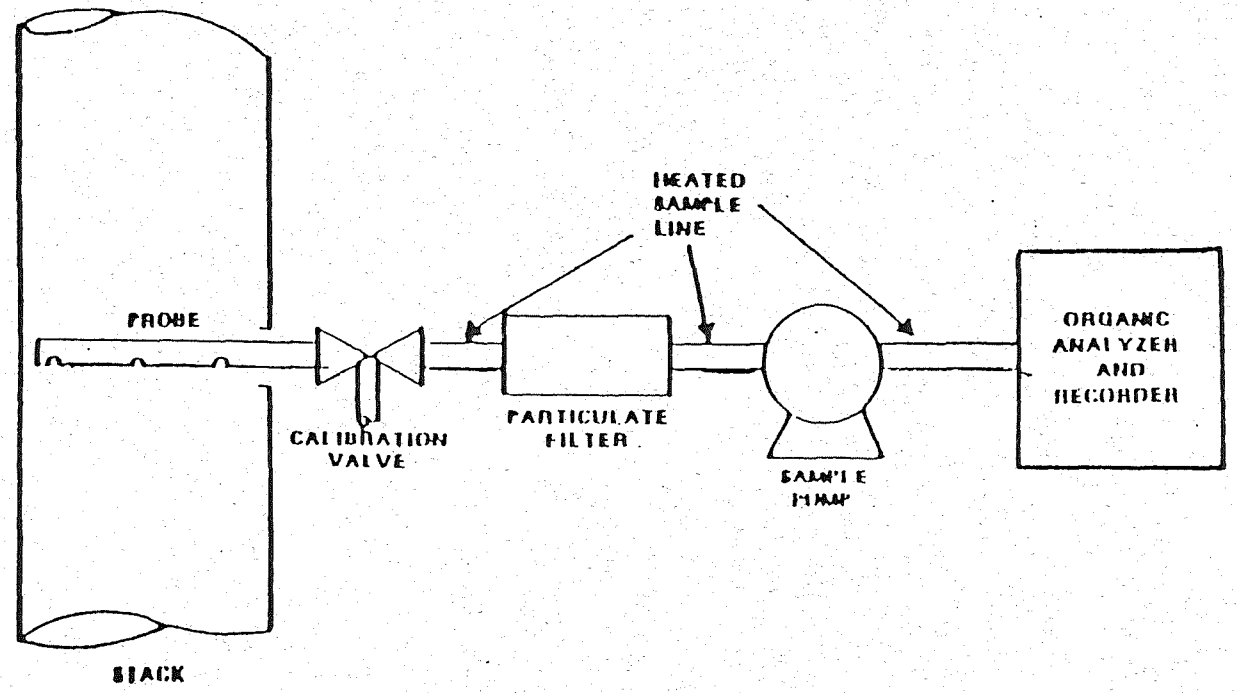

Figure 1

Total Hydrocarbon Sampling Train