

## **I. INTRODUCTION**

Network Environmental, Inc. was retained by Michigan Metal Coating Company of Port Huron, Michigan to conduct compliance emission testing at their Plant #2 Port Huron, Michigan facility. The purpose of the study was to determine the capture and destruction efficiency of the regenerative thermal oxidizer (RTO) servicing the EUDIPSPIN line, in accordance with their Permit to Install No. 24-19A.

The sampling was conducted on November 24, 2020 by Stephan K. Byrd and Richard D. Eerdmans of Network Environmental, Inc. The testing was performed in accordance with EPA Methods 24, 25A, 204 and 308. Mr. Steve Hlywa and the staff of Michigan Metal Coating Company coordinated source operation and data collection during the testing. Mr. Shamim Ahammod of EGLE-AQD was present to observe the testing and source operation.

**II. PRESENTATION OF RESULTS**

**II.1 TABLE 1**  
**VOC DESTRUCTION EFFICIENCY RESULTS (as Propane)**  
**MICHIGAN METAL COATING COMPANY PLANT #2**  
**RTO**  
**PORT HURON, MICHIGAN**  
**NOVEMBER 24, 2020**

Sample	Time	Concentration PPM <sup>(1)</sup>		Mass Emission Rate Lbs./Hr		% <sup>(2)</sup> Destruction Efficiency
		Inlet	Exhaust	Inlet	Exhaust	
1	11:15-12:15	19.8	0.6	2.94	0.10	96.70
2	12:50-13:50	20.7	0.5	3.12	0.08	97.40
3	14:05-15:05	18.6	0.5	2.86	0.08	97.18
<b>Average</b>		<b>19.7</b>	<b>0.5</b>	<b>2.97</b>	<b>0.09</b>	<b>97.10</b>

(1) PPM = Parts Per Million (v/v) on an actual (wet) basis

(2) Destruction Efficiencies were calculated using the mass emission rates

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**II.2 TABLE 2  
CAPTURE EFFICIENCY RESULTS  
MICHIGAN METAL COATING COMPANY PLANT #2  
PORT HURON, MICHIGAN  
RTO  
NOVEMBER 24, 2020**

Run #	Time	VOC's RM – Lbs. <sup>(1)</sup>	VOC's Applied - Lbs. <sup>(1)</sup>	% CE
1	09:15-11:15	1.74	1.98	87.63
2	11:45-13:45	1.34	1.53	87.50
3 <sup>(2)</sup>	14:18-16:18	1.02	1.27	80.37
4 <sup>(2)</sup>	15:15-16:15	2.65	2.32	114.20
5	16:35-17:35	1.40	1.58	88.58
6	17:50-18:50	1.30	1.49	86.88
<b>Average</b>				<b>87.64</b>

(1) Ethanol and Methanol only.

(2) Not used in the CE calculation.

### **III. DISCUSSION OF RESULTS**

**Destruction Efficiency** - The results of the destruction efficiency (DE) sampling are presented in Section II, Table 1. The Destruction Efficiencies for the three samples were 96.70% for sample one, 97.40% for sample two and 97.18% for sample three. The average of the three samples was 97.10%. The Destruction Efficiencies were calculated using the mass loadings, as propane, at the inlet and outlet of the RTO.

**Capture Efficiency** - The results of the capture efficiency sampling are presented in Section II, Table 2. The capture efficiencies for the four samples, used to calculate capture efficiency, were 87.62% for sample one, 87.50% for sample two, 87.57% for sample five and 86.87% for sample six. The average for the capture efficiency was 87.39%. Samples 3 and 4 were not used in the CE calculation because they did not fall within the DQO of the 95<sup>th</sup> percentile. The capture efficiencies were calculated using the mass VOC loading at the inlet to the RTO compared to the VOC loading of the coatings applied, in terms of Ethanol and Methanol, during each test run.

### **IV. SOURCE DESCRIPTION**

The source sampled was the RTO controlling the emissions from four dip spin coating lines and their associated ovens. See Appendix F for process data and coating usage.

### **V. SAMPLING AND ANALYTICAL PROTOCOL**

The RTO inlet and exhaust sampling was conducted on the 43-inch I.D. RTO inlet duct at a location approximately 2-duct diameters downstream and 2 duct diameters upstream from the nearest disturbance and the 46-inch I.D. RTO outlet stack at a location approximately 8-duct diameters downstream and greater than two duct diameter upstream from the exit.

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

- \* Destruction Efficiency - U.S. EPA Method 25A
- \* Capture Efficiency - U.S. EPA Methods 24, 204 and 308
- \* Exhaust Gas Parameters (flow rate, temperature, moisture and density) - U.S. EPA Methods 1 - 4.

**V.1 Destruction Efficiency** - The total hydrocarbon (VOC) sampling was conducted in accordance with U.S. EPA Reference Method 25A. The sample gas was extracted from the inlet and outlet of the RTO through heated Teflon sample lines that led to a Thermo Model 51 and a J.U.M Model 3-500 portable flame ionization detectors (FIDs). These analyzers produce instantaneous readouts of the total hydrocarbon concentrations (PPM). Three (3) samples were collected from each of the inlet and outlet of the RTO. Each sample was sixty (60) minutes in duration. The sampling on the RTO inlet and exhaust was conducted simultaneously for the DE.

A systems (from the back of the stack probe to the analyzer) calibration was conducted for the analyzers prior to the testing. A span gas of 96.9 PPM propane was used to establish the initial instrument calibration for the analyzers. Propane calibration gases of 30.2 and 50.6 PPM 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 PPM propane were performed to establish system drift of the 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.

**V.2 Capture Efficiency** - The capture efficiency determination was performed in accordance with EPA Methods 24, 204 and 308. A Teflon sample line was used to extract the samples from the inlet to the oxidizer. Two midjet impingers with fifteen milliliters of deionized water followed by two Silica Gel tubes in series were used to collect the samples. The sampling system was operated at approximately 500 cc/min during the testing. A vacuum pump with a calibrated critical orifice was used to collect the samples. Each sample was sixty (60) minutes in duration. A total of six samples were collected.

The samples were recovered and refrigerated until they were analyzed. The samples were analyzed by Gas Chromatograph with a Flame Ionization Detector (FID) for ethanol and methanol. A spiked duplicate sample was collected with one of the six test runs. The tubes were spiked with approximately 49 ug of each compound and the liquid spikes were approximately 148 ug of each compound. The recovery for the duplicate sample was 95.98%. All quality assurance and quality control requirements specified in the method were incorporated in the sampling and analysis.

The coating usage was determined by weighing containers of coating to the nearest 0.1 pounds. Weights were recorded at the beginning and end of each sixty-minute run. The VOC content of each coating batch used was determined by EPA Method 24. Two coating samples were collected from each tote.

The analytical data can be found in Appendix D and the coating usage data can be found in Appendix F.

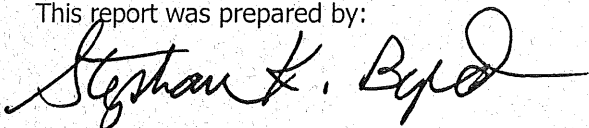
**V.3 Exhaust Gas Parameters** - The exhaust gas parameters (airflow rate, temperature, moisture and density) were determined in accordance with U.S. EPA Methods 1-4. Moisture was determined by employing the wet bulb/dry bulb measurement technique. Oxygen and carbon dioxide concentrations (%) were determined by collecting a bag sample (grab sample) and Orsat analysis. Twelve (12) sample points were used for the velocity determination on the 46" outlet and sixteen (16) were used on the 43" inlet.

The sample points were as follows:

Point #	Point Location (Inches)	
	Inlet	Outlet
1	1.38	2.02
2	4.52	6.72
3	8.34	13.62
4	13.89	32.23
5	29.11	39.23
6	34.66	43.98
7	38.48	
8	41.62	

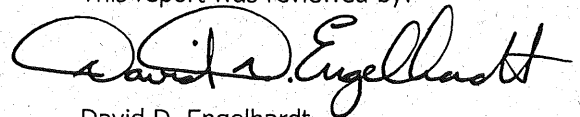
One velocity traverse was performed at the inlet of the RTO for each CE sample taken. One velocity traverse was performed at the inlet and outlet of the RTO for each DE test run. All quality assurance and quality control requirements specified in the method were incorporated in the sampling and analysis.

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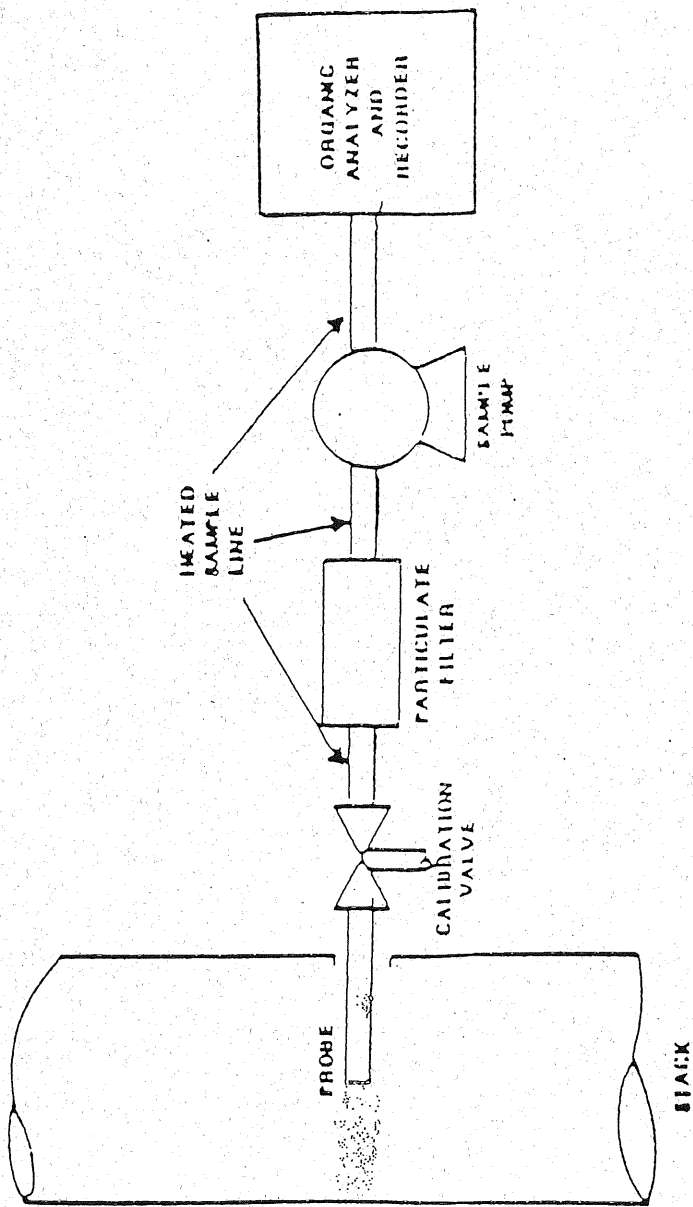


Figure 1  
THC Sampling Train

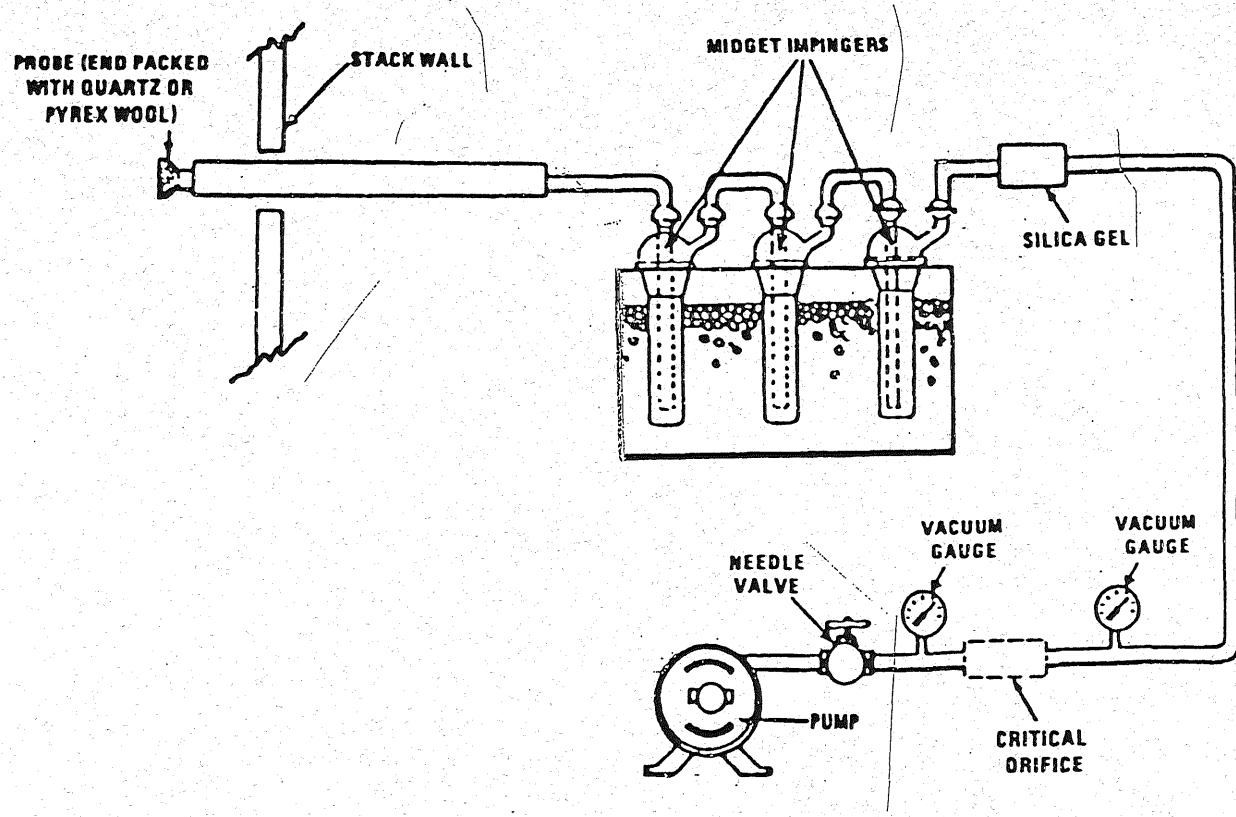


Figure 2  
Method 308 Sampling Train