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I. INTRODUCTION

Network Environmental, Inc. was retained by Eagle Alloy, Inc. of Muskegon, Michigan to conduct a VOC (total hydrocarbon) emission study on their Sand Coating Thermal Oxidizer. The purpose of the study was to meet the testing requirements of Michigan Department of Environment, Great Lakes and Energy (EGLE) - Air Quality Division Permit to Install No. 95-01G. EGLE Air Permit No. 95-01G has established the following emission limit for this source:

Source	Pollutant	Emission Limit
Sand Coating Thermal Oxidizer	VOC	4.6 Lbs/Hr

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

- Total Hydrocarbons (VOC) – U.S. EPA Method 25A
- Exhaust Gas Parameters (flow rate, temperature, moisture & density) – U.S. EPA Methods 1-4

The sampling in the study was conducted on September 27, 2022 by Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc.. Assisting with the study was Mr. Steven Spiwak of Eagle Alloy, Inc. and the operating staff of the facility. Mr. Eric Grinstern of the EGLE - Air Quality Division was present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

**II.1 TABLE 1
TOTAL HYDROCARBON (VOC) EMISSION RESULTS
SAND COATER THERMAL OXIDIZER EXHAUST
EAGLE ALLOY, INC.
MUSKEGON, MICHIGAN
SEPTEMBER 27, 2022**

Sample	Time	Air Flow Rate SCFM ⁽¹⁾	VOC Concentration PPM ⁽²⁾	VOC Mass Emission Rates
				Lbs/Hr ⁽³⁾
1	08:19-09:19	4,594	2.2	0.069
2	09:31-10:31	4,649	2.5	0.079
3	10:42-11:42	4,481	2.6	0.080
Average		4,575	2.4	0.076

(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 of VOC Per Hour As Propane

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 Total Hydrocarbon (VOC) Emission Results (Table 1)

Table 1 summarizes the VOC emission results as follows:

- Sample
- Time
- Air Flow Rate (SCFM) – Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- VOC Concentration (PPM) – Parts Per Million (v/v) On An Actual (Wet) Basis
- VOC Mass Emission Rate (Lbs/Hr) – Pounds of VOC Per Hour

The VOC results are as propane.

III.2 Emission Limits (Permit to Install No. 95-01G)

Compound	Emission Limit(s)
Total Hydrocarbons (VOC)	4.6 Lbs/Hr

IV. SAMPLING AND ANALYTICAL PROTOCOL

The sampling location met the eight (8) duct diameters downstream and two (2) duct diameters upstream requirement of U.S. EPA Method 1. The exhaust stack is 34 inches in diameter and has two (2) sampling ports. A total of 12 traverse points were used for the sample traversing (6 points per port). The sample point dimensions were as follows:

<u>Traverse Point</u>	<u>Dimension (Inches)</u>
1	1.50
2	4.96
3	10.06
4	23.94
5	29.04
6	32.50

IV.1 Total Hydrocarbons (VOC) – The VOC sampling was conducted in accordance with U.S. EPA Reference Method 25A. A J.U.M. Model 3-500 flame ionization detector (FID) analyzer was used to monitor the source sampled. Sample gas was extracted through a heated probe. A heated teflon sample line was used to transport the exhaust gases to the analyzer. The analyzer produces instantaneous readouts of the VOC concentrations (PPM).

The analyzer was calibrated by system injection (from the back of the stack probe to the analyzer) prior to the testing. A span gas of 94.9 PPM was used to establish the initial instrument calibration. Calibration gases of 30.2 PPM and 50.6 PPM were used to determine the calibration error of the analyzer. After each sample, a system zero and system injection of 30.2 PPM were performed to establish system drift and system bias during the test period. All calibration gases used were EPA Protocol Propane Calibration Gases. Three (3) samples were collected from the exhaust. Each sample was sixty (60) minutes in duration.

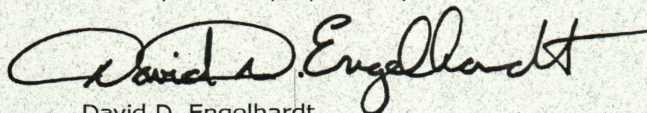
The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from the exhaust. The analyzer averages were corrected for calibration error and drift using formula EQ.7E-5 from 40 CFR Part 60, Appendix A, Method 7E. Figure 1 is a diagram of the VOC sampling train.

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.

Three (3) velocity traverses (one for each sample) and one (1) moisture sample were collected. A bag sample was collected from the exhaust of the moisture train and analyzed by Orsat in order to determine the oxygen (O₂) and carbon dioxide (CO₂) content of the exhaust gas.

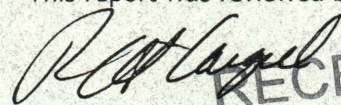
All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

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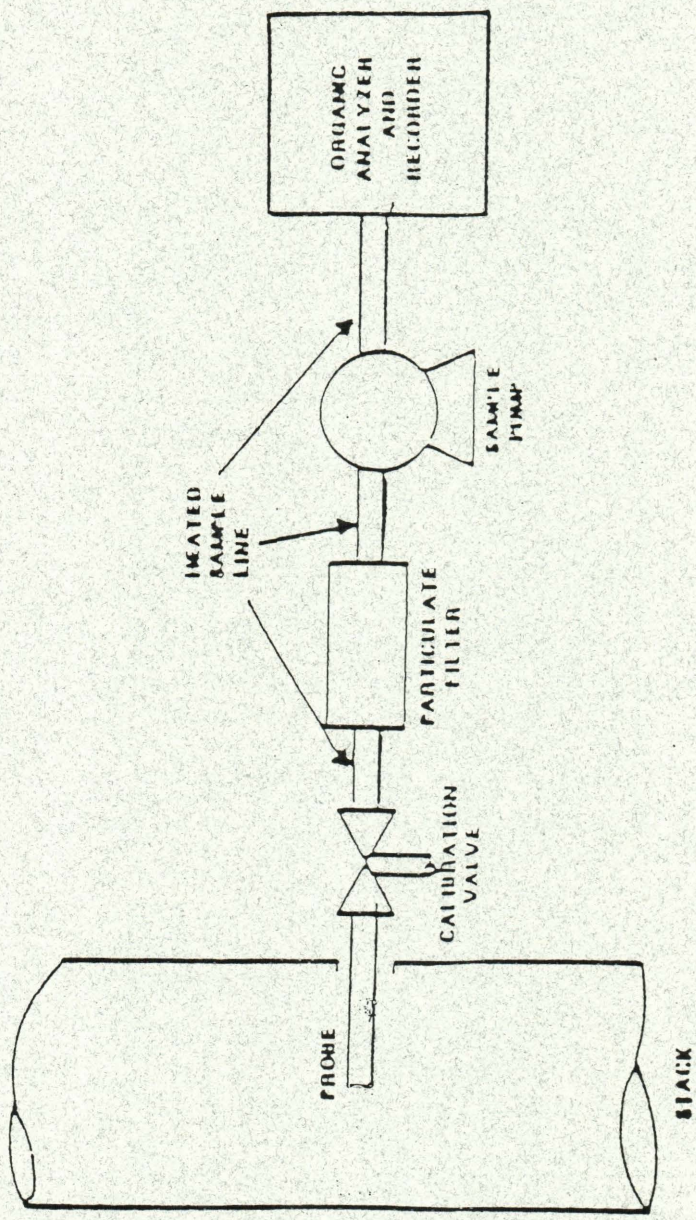


Figure 1
Total Hydrocarbon (VOC)
Sampling Train