Report of a...

VOC Destruction Efficiency Test

Performed at...

Hutchinson Aerospace & Industry

Ithaca, Michigan

On the...

Regenerative Thermal Oxidizer (RTO)

January 7, 2020

121.20

By...

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Grand Rapids, MI

Performed for:

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I. INTRODUCTION

Network Environmental, Inc. was retained by Fishbeck of Grand Rapids, MI to conduct a VOC (total hydrocarbons) destruction efficiency test on the RTO (regenerative thermal oxidizer) located at the Hutchinson Aerospace & Industry facility in Ithaca, MI. The purpose of the study was to document compliance with EGLE Air Quality Division Permit To Install (PTI) No. 57-05C. PTI No. 57-05C has established a 95% destruction efficiency (DE) limit for the oxidizer at this facility.

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 January 7, 2020 by R. Scott Cargill, Richard D. Eerdmans and David D. Engelhardt of Network Environmental, Inc. Assisting in the study were Mr. Timothy Swainston of Fishbeck, Mr. Donald English and Mr. Mike Clingan of Hutchinson Aerospace & Industry and the operating staff of the facility. Mr. David Patterson and Ms. Michelle Luplow 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 AEROSPACE & INDUSTRY
ITHACA, MICHIGAN
JANUARY 7, 2020

Sample	Time	Air Flow Rate SCFM (1)		Concentration PPM (2)		Mass Emission Rate Lbs/Hr (3)		Percent (4) Destruction Efficiency
		Inlet	Exhaust	Inlet	Exhaust	Inlet	Exhaust	
1	10:10-11:10	8,303	9,285	488.6	16.5	27.72	1.05	96.21
2	11:45-12:45	8,183	9,314	393.0	13.1	21.97	0.83	96.22
3	13:19-14:19	8,145	9,225	414.1	13.7	23.05	0.86	96.27
Average		**8,210**	**9,275**	**431.9**	**14.4**	**24.25**	**0.91**	**96.23**

(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) Percent Destruction Efficiency was calculated using the mass rate (Lbs/Hr)

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) 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.

The total sampling time for each run was sixty (60) minutes. Each sample duration was for a continuous sixty (60) minutes. There were no process operating disturbances during the samples.

IV. SOURCE DESCRIPTION

The source sampled was the regenerative thermal oxidizer (RTO) that controls emissions from the coating booths. Metal parts are coated with primer and/or adhesives in the booths and then rubber is bonded to the metal part. The RTO controls the booths and conveyor lines leading into and out of the spray booths. The parts coated and the coatings applied during the testing were considered normal operation for the coating lines.

Source operating data, during the sampling, can be found in Appendix F.

V. SAMPLING AND ANALYTICAL PROTOCOL

The exhaust sampling was conducted on the 30 inch I.D. exhaust stack at a location approximately eight (8) duct diameters downstream and greater than two (2) duct diameters upstream from the nearest disturbances. The inlet sampling was conducted on the 24 inch I.D. inlet duct at a location approximately eight (8) duct diameters downstream and two (2) 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 2,019 PPM (inlet) and 94.9 PPM (exhaust) were used to establish the initial instrument calibrations. Calibration gases of 959.3 PPM & 491.0 PPM (for the inlet) and 50.6 PPM & 30.2 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 491.0 PPM (for the inlet) and 30.2 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 at each location and analyzed by Orsat to determine the oxygen (O_2) and carbon dioxide (CO_2) content.

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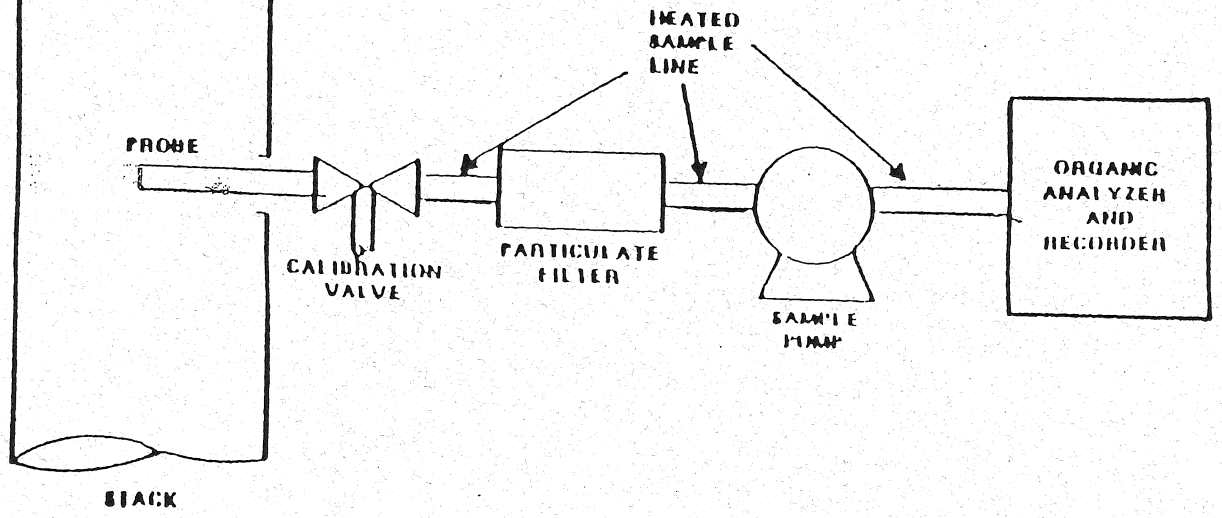

Figure 1

VOC
Sampling Train