Report of a...

THC Emission Test

Performed for...

ARCADIS U.S., Inc.
Irvine, California

Performed at...

Bodycote, Inc.
Grand Rapids, Michigan

On ...

Heat Treating Furnaces
Unit #13 and Unit #5

March 5-6, 2014

296.01

Network Environmental, Inc.
Grand Rapids, MI

Performed For:

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I. INTRODUCTION

Network Environmental, Inc. was retained by ARCADIS U.S., Inc. to perform an emission study at the Bodycote, Inc. facility in Grand Rapids, Michigan. The purpose of the study was to quantify Total Hydrocarbon emissions from the exhausts of Heat treating line #13 consisting of a natural gas fired furnace with integral oil quench and Heat treating line #5 consisting of a vacuum quench furnace with electric burners with integral oil quench. The testing was performed to demonstrate compliance with Special Condition V.1. of Permit-To-Install 98-13.

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

- THC – U.S. EPA Method 25A
- Methane – Method 18
- Exhaust Gas Parameters – U.S. EPA Methods 1 through 4

The sampling was performed on March 5 and 6, 2014 by Stephan K. Byrd and Richard D. Eerdmans of Network Environmental, Inc. Assisting with the study was Mr. Scot Garner of Bodycote and Mr. Vasco Roma of ARCADIS. Mr. Dave Patterson and Mr. Dave Morgan of the Michigan Department of Environmental Quality (MDEQ) – Air Quality Division were present to observe the sampling and source operation.

II. PRESENTATION OF RESULTS

II.1 TABLE 1
THC EMISSION RESULTS SUMMARY AS PROPANE
HEAT TREAT FURNACE EXHAUSTS
BODYCOTE, INC.
GRAND RAPIDS, MICHIGAN

Source	Date	Time	Concentration	Mass Emission Rate
			PPM(1)	Lbs/Hr(2)
Unit #13	3/5/14	11:42-12:41	20.5	0.146
Unit #13	3/5/14	12:43-13:42	21.6	0.154
Unit #13	3/5/14	13:44-14:43	13.6	0.097
Unit #13	3/5/14	14:45-15:44	18.8	0.157
Unit #13	3/5/14	15:46-16:46	19.9	0.166
Unit #13	3/5/14	16:47-17:46	13.2	0.110
Unit #13	3/5/14	17:49-18:48	11.8	0.102
Unit #13	3/5/14	18:50-19:37	15.6	0.136
Unit #5	3/6/14	09:03-10:02	4.2	0.003
Unit #5	3/6/14	10:04-11:03	3.8	0.003
Unit #5	3/6/14	11:04-12:03	5.0	0.003
Unit #5	3/6/14	12:06-13:05	21.9	0.120

(1) PPM = Parts per million by volume on a wet basis as propane
(2) Lbs/Hr = Pounds of THC per hour as propane

II.2 TABLE 2
METHANE RESULTS SUMMARY AS PROPANE
HEAT TREAT FURNACE EXHAUSTS
BODYCOTE, INC.
GRAND RAPIDS, MICHIGAN

Source	Date	Time	Concentration PPM(1)
Unit #13	3/5/14	11:55	18.0
Unit #13	3/5/14	14:46	4.4
Unit #13	3/5/14	18:34	5.1
Unit #5	3/6/14	10:26	1.8
Unit #5	3/6/14	12:34	1.5

(1) PPM = Parts per million on a wet basis as propane.

III. DISCUSSION OF RESULTS

The results of the emission sampling are summarized in Tables 1 and 2 (Section II.1). The results are presented as follows:

III.1 THC Emission Results (Table 1)

Table 1 summarizes the TNMOC emission results as follows:

- Source
- Date
- Time
- Concentration (PPM) – Parts per million on a wet basis as propane
- Mass Emission Rate (Lbs/Hr) – Pounds of THC Per hour as propane

III.1 Methane Results (Table 2)

Table 2 summarizes the Methane results as follows:

- Source
- Date
- Time Collected
- Concentration (PPM) – Parts per million on a wet basis as propane

IV. SOURCE DESCRIPTION

The sources tested were two heat treating production lines. Heat treating line #13 consisting of a natural gas fired furnace with integral oil quench and heat treating line #5 consisting of a vacuum quench furnace with electric burners with integral oil quench were tested. The total duration of one batch was sampled for each source. The parts treated during each test represented maximum normal production. Source operation information can be found in Appendix C.

V. SAMPLING AND ANALYTICAL PROTOCOL

V.1 THC – The THC was conducted in accordance with U.S. EPA Method 25A. The sample gas was extracted from the sources through a heated Teflon sample line, which led to a J.U.M Model 3-500 portable flame ionization detector (FID). This analyzer produces instantaneous readouts of the total hydrocarbon concentrations (PPM). One sample was collected over the total duration of the batch from each of the sources. The analyzer was operated on the 0-1000 PPM scale

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 959.3 PPM propane was used to establish the initial instrument calibration for the analyzer. Propane calibration gases of 85.78 PPM, 247.1 PPM and 453.6 PPM were used to determine the calibration error of the analyzers. After each sample (60 minute sample period), a system zero and system injection of 85.78 PPM propane were performed to establish system drift of analyzer 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 analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from heat treat line exhausts. 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 Methane – The methane determination was performed in accordance with US EPA Method 18. Tedlar bag samples were collected at the beginning, mid-way and near the end of the batch for Unit #13. Tedlar bag samples were collected at the beginning and near the end of the batch for Unit #5. The bags were filled from the exhaust of the heated manifold used to extract the samples from the exhausts.

The samples were shipped over-night to the laboratory. The samples were analyzed for methane by gas chromatograph. All quality assurance and quality control requirements specified in the method were incorporated in the performance of this determination.

V.3 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. Velocity traverses were performed at the beginning, mid-way and at the end of the batch for Unit #13.

Velocity traverses were performed at the begging and the end of the batch for Unit #5. Moisture was determined by the wet bulb/dry bulb method. 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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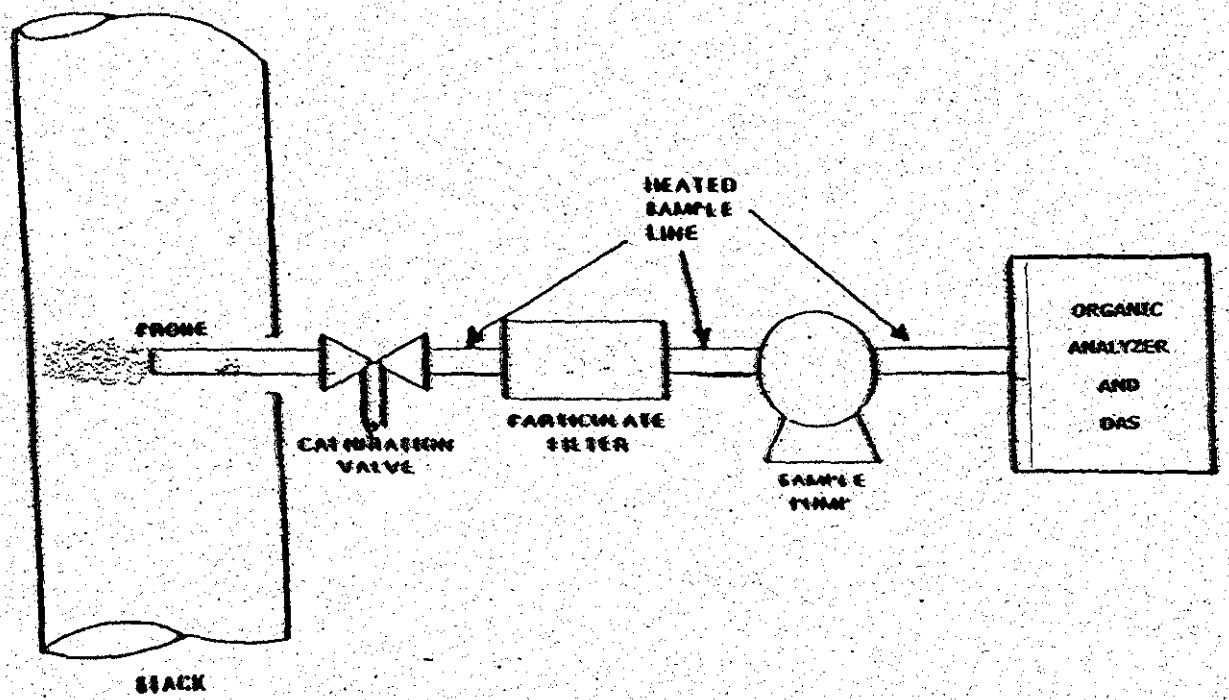

Figure 1

THC Sampling Train