Report of...

ROP Compliance Testing

performed for...

Kautex Textron,
CWC Division
Muskegon, Michigan

on the

Cupola Exhaust

September 12, 2017

209.03

RECEIVED
NOV 13 2017
AIR QUALITY DIVISION

Network Environmental, Inc.
Grand Rapids, MI

I. INTRODUCTION

Network Environmental, Inc. was retained by CWC Textron of Muskegon, Michigan to perform compliance emission testing on their Cupola Exhaust. The purpose of the sampling was to comply with their Air Permit # MI-ROP-B1909-2013a. The testing was for the following selected compounds:

- Metal HAPS – Arsenic, Antimony, Beryllium, Cadmium, Chromium, Cobalt, Lead, Manganese, Mercury, Nickel and Selenium
- Particulates
- Carbon Monoxide
- Oxides of Nitrogen
- Sulfur Dioxide

Sampling was conducted on the exhaust by employing the following reference test methods:

- Metals - U.S. EPA Method 29
- Particulate – U.S. EPA Method 5
- Carbon Monoxide - U.S. EPA Method 10
- Oxides of Nitrogen – U.S. EPA Method 7E
- Sulfur Dioxide - U.S. EPA Method 6C
- Exhaust Gas Parameters (airflow rate, temperature, moisture & density) - U.S. EPA Methods 1-4

The sampling was conducted on September 12, 2017. Stephan K. Byrd, R. Scott Cargill, and Richard D. Eerdmans of Network Environmental, Inc. performed the testing. Mr. Bob Meacham of CWC Textron was present to coordinate source operations and data recording and collection during the testing. Mr. Thomas Gasloli and Mr. Eric Grinstern of the MDEQ, Air Quality Division, were present to observe the testing and source operation.

II. PRESENTATION OF RESULTS

II.1 TABLE 1
METALS EMISSION RESULTS
CUPOLA EXHAUST
CWC TEXTRON
MUSKEGON, MICHIGAN
SEPTEMBER 12, 2017

Metal	Sample 1 09:03-11:55	Sample 2 12:41-14:47	Sample 3 15:33-18:46	**Average**
	Lbs/Ton of Metal Charged	Lbs/Ton of Metal Charged	Lbs/Ton of Metal Charged	Lbs/Ton of Metal Charged
Arsenic (Ar)	7.80E-06	7.50E-06	5.62E-06	**6.97E-06**
Antimony (Sb)	3.69E-05	3.78E-05	2.87E-05	**3.44E-05**
Beryllium (Be)	9.50E-07	7.36E-07	5.59E-07	**7.48E-07**
Cadmium (Cd)	3.27E-06	5.73E-06	5.87E-06	**4.96E-06**
Chromium (Cr)	6.20E-05	1.96E-04	7.80E-05	**1.12E-04**
Cobalt (Co)	7.08E-06	8.41E-06	6.68E-06	**7.39E-06**
Lead (Pb)	3.21E-04	5.06E-04	3.27E-04	**3.85E-04**
Manganese (Mn)	1.50E-02	1.71E-02	1.46E-02	**1.56E-02**
Mercury (Hg)	2.42E-06	3.34E-06	2.41E-06	**2.72E-06**
Nickel (Ni)	2.53E-05	1.17E-04	3.47E-05	**5.91E-05**
Selenium (Se)	8.08E-06	6.26E-06	4.46E-06	**6.27E-06**
Total	**1.55E-02**	**1.80E-02**	**1.50E-02**	**1.62E-02**

Tons of Metal charged for Run 1 = 25.02, Run 2 = 19.66 and Run 3 = 27.71. charge data from CWC staff.

II.2 TABLE 2
PARTICULATE EMISSION RESULTS
CUPOLA EXHAUST
CWC TEXTRON
MUSKEGON, MICHIGAN
SEPTEMBER 12, 2017

Sample #	Time	Air Flow Rate DSCFM	Lbs/1000 Lbs Dry(1)	Lbs/Hr(2)
1	09:03-11:55	40,937	0.063	12.021
2	12:41-14:47	43,751	0.062	12.420
3	15:33-18:46	44,134	0.058	11.895
Average		**42,941**	**0.061**	**12.021**

(1) = Pounds of particulate per 1000 pounds of exhaust gas on a dry basis.
(2) = Pounds of particulate per hour.

II.3 TABLE 3
CO EMISSION RESULTS
CUPOLA EXHAUST
CWC TEXTRON
MUSKEGON, MICHIGAN
SEPTEMBER 12, 2017

Sample #	Time	Air Flow Rate DSCFM	Concentration PPM	Mass Rate Lbs/Hr
1	09:00-10:42	40,937	2,244.5	398.0
2	10:21-12:02	43,751	2,370.5	449.3
3	13:13-14:50	44,134	2,499.2	477.9
Average		**42,941**	**2,371.4**	**441.7**

II.4 TABLE 4
NO_x EMISSION RESULTS
CUPOLA EXHAUST
CWC TEXTRON
MUSKEGON, MICHIGAN
SEPTEMBER 12, 2017

Sample #	Time	Air Flow Rate DSCFM	Concentration PPM	Mass Rate Lbs/Hr
1	09:00-10:42	40,937	19.0	5.53
2	10:21-12:02	43,751	20.5	6.38
3	13:13-14:50	44,134	14.5	4.55
Average		**42,941**	**18.0**	**5.49**

II.5 TABLE 5
SO_2 EMISSION RESULTS
CUPOLA EXHAUST
CWC TEXTRON
MUSKEGON, MICHIGAN
SEPTEMBER 12, 2017

Sample #	Time	Air Flow Rate DSCFM	Concentration PPM	Mass Rate Lbs/Hr
1	09:00-10:42	40,937	0.0	-
2	10:21-12:02	43,751	0.2	0.04
3	13:13-14:50	44,134	0.0	-
Average		**42,941**	**0.07**	**0.013**

III. DISCUSSION OF RESULTS

The results of the emission testing performed on September 12, 2017 can be found in Section II, Tables II.1. through II.5.

The ROP emission limit for this source is 0.15 Lbs/1000 Lbs, Dry for particulates. The MACT limits for this source are 0.8 pounds per ton of metal charged for PM, 0.06 pounds per ton of metal charged for MACT metals and 20 percent opacity (fugitive) six minute average, except one six minute average that does not exceed 30 percent opacity.

The results of the opacity observations, performed in conjunction with the particulate testing, showed no six minute averages over 20 percent opacity. The opacity data can be found in Appendix G.

IV. SOURCE OPERATION

The cupola was operated at an average of 24 tons of metal charged per hour during the testing. Source operating data can be found in Appendix B.

V. SAMPLING AND ANALYTICAL PROTOCOL

The determinations were preformed in accordance with the following sampling and analytical protocols. Laboratory data can be found in Appendix C.

V.1 Particulate/Metals - The metals (Arsenic, Antimony, Beryllium, Cadmium, Chromium, Cobalt, Mercury, Lead, Manganese, Nickel, and Selenium) and particulate emission sampling was conducted in accordance with U.S. EPA Method 29 (multiple metals train) and EPA Method 5. Figure 1 is a schematic diagram of the Method 29/5 sampling train. Sample one was one hundred twenty minutes. Samples two and three were ninety six (96) minutes in duration and had a minimum sample volume of sixty (60) dry standard cubic feet. The samples were collected isokinetically on quartz filters, and in a nitric acid/hydrogen peroxide solution followed by an acidic potassium permanganate solution.

The filters and nozzle/probe rinses (front half) were analyzed gravimetrically for weight gain for the particulate analysis. The front was then combined with the impinger catch of nitric acid/hydrogen peroxide solution and was analyzed for the specific metals by Inductively Coupled Argon Plasma (ICAP)/Mass Spectrometer (MS). The front half, the nitric acid/hydrogen peroxide solutions and the acidic potassium permanganate solutions were analyzed for mercury by cold vapor atomic absorption spectrophotometry (CVAAS). All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

V.2 Carbon Monoxide - The CO determination was conducted in accordance with U.S. EPA Method 10. A Thermo Environmental 48C stack gas analyzer was used to monitor the CO emissions. The sample gases were extracted from the stack through a heated Teflon sample line which led to a VIA MAK 2 sample gas conditioner (to remove moisture and reduce temperature) and then to the analyzer. The analyzer produces instantaneous readouts of the CO concentrations (PPM). The monitor was operated on the 10,000 PPM scale.

The analyzer was calibrated by direct injection prior to the testing. A span gas of 4,509 PPM was used to establish the initial instrument calibration. Calibration gases of 2,215 PPM and 985.3 PPM were used to determine the calibration error of the instrument. The sampling system (from back of the stack probe to the analyzer) was injected with the 2,215 PPM calibration gas to determine system bias. After each sample, a system zero and system injection of 2,215 PPM were performed to establish system drift and system bias during each test period. All calibration gases were EPA Protocol 1 Certified.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data. Three samples were collected from the exhaust. Each sample was sixty minutes in duration. All the quality assurance and quality control requirements specified in the methods were incorporated in the sampling and analysis. Figure 2 is a diagram of the sampling train.

IV.3 Oxides of Nitrogen - The NO_x sampling was conducted in accordance with U.S.

EPA Reference Method 7E. A Thermo Environmental Model 42H gas analyzer was used to monitor the exhaust. A heated Teflon sample line was used to transport the exhaust gases to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner stack gases were passed to the analyzer. The analyzer produces instantaneous readouts of the NO_x concentrations (PPM). The analyzer was operated on the 0-250 ppm scale.

The analyzer was calibrated by direct injection prior to the testing. A span gas of 250.1 PPM was used to establish the initial instrument calibration. Calibration gases of 131.0 PPM and 54.0 PPM were used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) was injected using the 131.0 PPM gas to determine the system bias. After each sample, a system zero and system injection of 131.0 PPM were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from the exhaust. Three (3) samples, each sixty (60) minutes in duration, were collected from the exhaust. A diagram of the sampling train is shown in Figure 2.

V.4 Sulfur Dioxide – The SO_2 sampling was conducted in accordance with U.S. EPA Reference Method 6C. A Bovar Model 721M gas analyzer was used to monitor the exhaust stack. A heated Teflon sample line was used to transport the exhaust gases to a gas conditioner to remove moisture and reduce the temperature. From the gas conditioner stack gases were passed to the analyzer. The analyzer produces instantaneous readouts of the SO_2 concentrations (PPM).

The analyzer was calibrated by direct injection prior to the testing. A span gas of 254.2 PPM was used to establish the initial instrument calibration. Calibration gases of 147.9 PPM and 97.1 PPM were used to determine the calibration error of the analyzer. The sampling system (from the back of the stack probe to the analyzer) was injected using the 97.1 PPM gas to determine the system bias. After each sample, a system zero and system injection of 97.1 PPM were performed to establish system drift and system bias during the test period. All calibration gases were EPA Protocol 1 Certified.

The analyzer was calibrated to the output of the data acquisition system (DAS) used to collect the data from the unit. All reference method data was corrected using Equation 7E-5 from U.S. EPA Method 7E. A diagram of the sampling train is shown in Figure 2.

V.5 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. All the sampling was conducted on the exhaust stack. There were two sampling ports on the exhaust located at 90 from each other and on the same plane. The test port location met the optimum location criteria of U.S. EPA Method 1. A twelve point (six points per port) traverse was used to perform the sampling. The sampling points were as follows:

Point #	Point Location (Inches)
1	3.70
2	12.26
3	24.86
4	59.14
5	71.74
6	80.30

O_2 and CO_2 content were performed by U.S. EPA Method 3A (instrumental method). The moisture was determined from the isokinetic sampling train. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

This report was prepared by:

Stephan K. Byrd
Project Manager

This report was reviewed by:

David D. Engelharut
Vice President

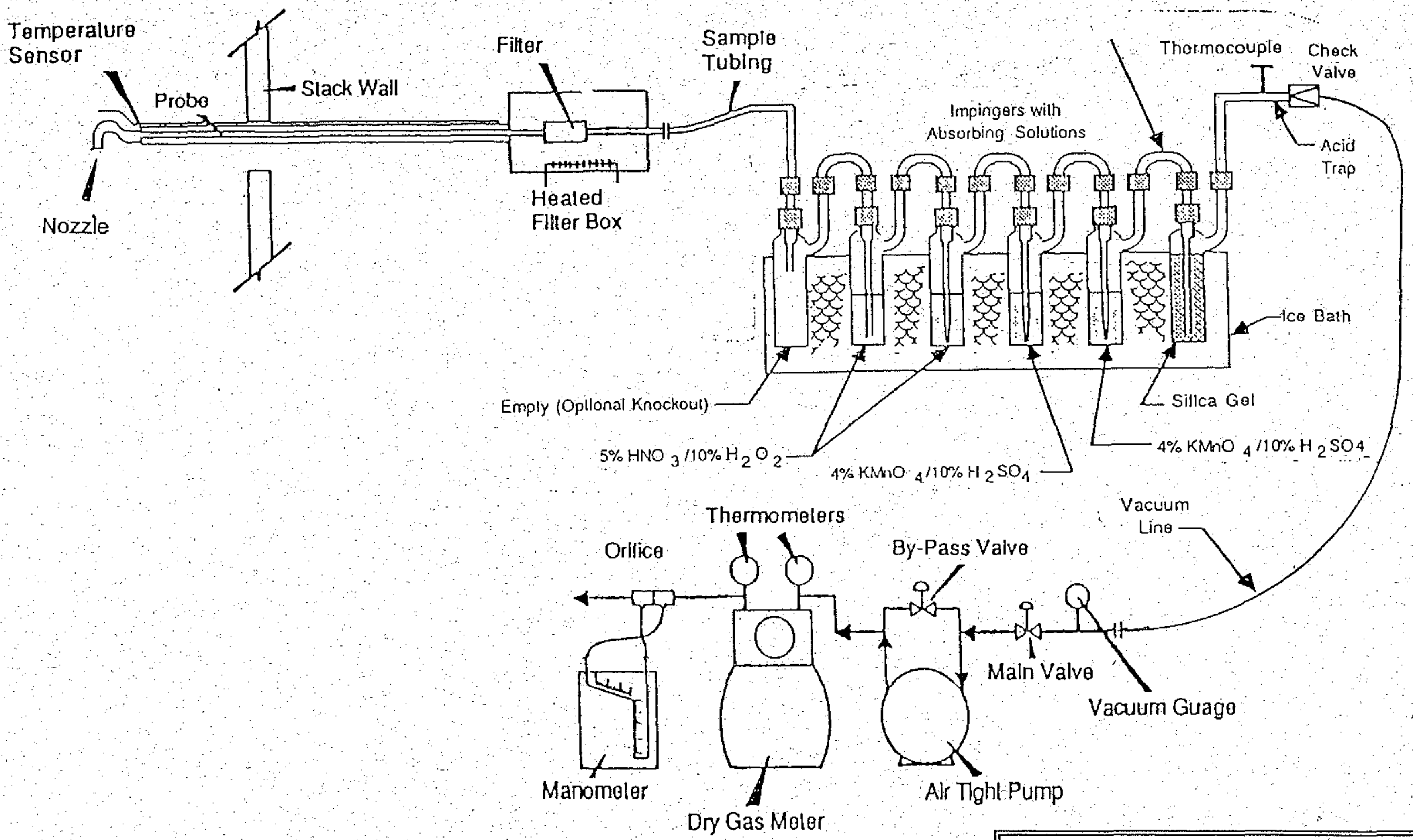

Figure 1

Particulate/Metals Sampling Train

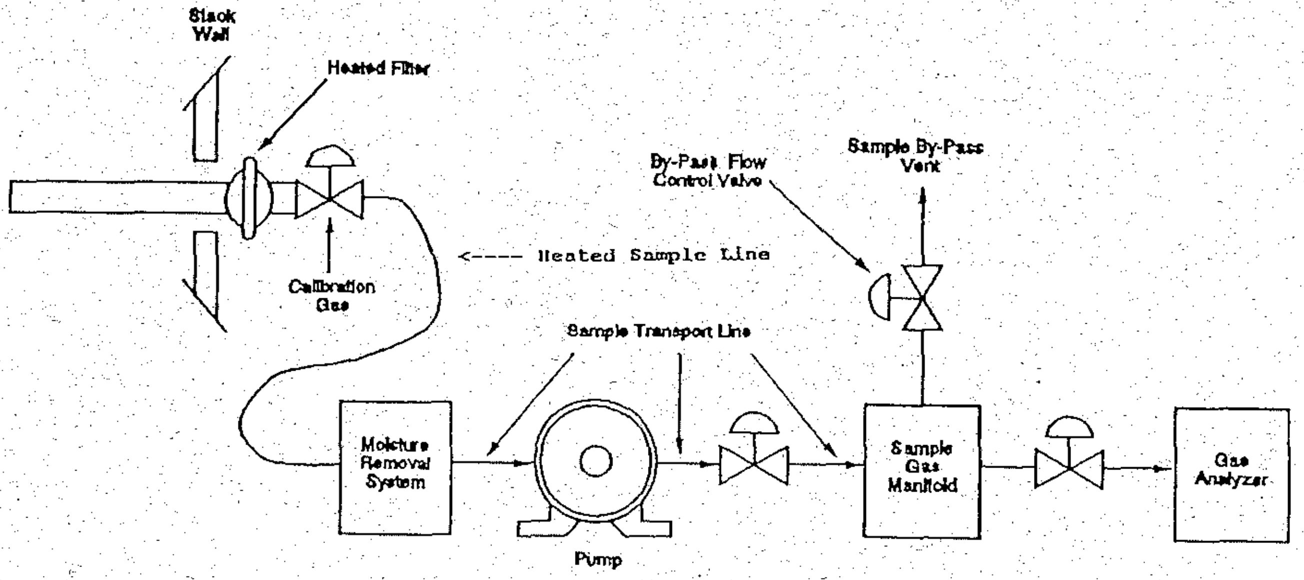

Figure 2

CO, NO_x and SO_2 Sampling Train