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Report of...

AIR QUALITY DIV.

Compliance Emission Sampling

Performed for...

DEQ-AQD

SEP 17 2013

Metavation, LLC Saginaw Bay

Vassar, Michigan

On the...

Cupola Scrubber Exhaust

July 23-24, 2013

294.02

Network Environmental, Inc.
Grand Rapids, MI

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II. PRESENTATION OF RESULTS

**II. TABLE 1
 FILTERABLE PARTICULATE⁽¹⁾ EMISSION RESULTS
 METAVATION
 VASSAR, MICHIGAN**

Source	Sample	Date	Time	Air Flow Rate DSCFM ⁽²⁾	Particulate Concentration Lbs/1000 Lbs, Dry ⁽³⁾	Particulate Mass Rates	
						Lbs/Hr ⁽⁴⁾	Lbs/Ton of Charge ⁽⁵⁾
Cupola Exhaust Stack	1	7/23/13	08:27-09:30	18,416	0.128	11.11	0.781
	2	7/23/13	10:03-11:06	19,111	0.109	9.88	0.852
	3	7/23/13	11:32-12:36	18,785	0.161	14.26	1.252
	Average			18,771	0.133	11.75	0.962

- (1) Filterable Particulate = Front Half Filterable Particulate
- (2) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- (3) Lbs/1000 Lbs, Dry = Pounds Of Particulate Per Thousand Pounds Of Exhaust Gas On A Dry Basis
- (4) Lbs/Hr = Pounds Of Particulate Per Hour
- (5) Lbs/Ton Charged = Pound Per Ton of Metal Charged. Calculated Using Charge Rates of 14.22 Tons/Hr For Sample 1, 11.60 Tons/Hr For Sample 2 & 11.39 Tons/Hr For Sample 3.

**II.3 TABLE 3
TOTAL METAL HAP'S EMISSION RESULTS
CUPOLA SCRUBBER EXHAUST
METAVATION
VASSAR, MICHIGAN**

Sample	Date	Time	Air Flow Rate DSCFM	Total Metal HAP's Concentration Grains/DSCF	Total Metal HAP's Mass Rates	
					Lbs/Hr	Lbs/Ton Charged
1	7/24/13	07:03-09:17	19,504	0.0042	0.71	0.157
2	7/24/13	09:54-11:43	19,378	0.0048	0.79	0.091
3	7/24/13	12:17-14:03	20,016	0.0055	0.95	0.126
Average			19,632	0.0048	0.82	0.125

(6) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)

(7) Grains/DSCF = Grains Per Dry Standard Cubic Foot

(8) Lbs/Hr = Pounds Per Hour

(9) Lbs/Ton Charged = Pound Per Ton of Metal Charged. Calculated Using Charge Rates of 4.49 Tons/Hr For Sample 1, 8.72 Tons/Hr For Sample 2 & 7.51 Tons/Hr For Sample 3.

**II.5 TABLE 5
 CARBON MONOXIDE (CO) EMISSION RESULTS
 CUPOLA SCRUBBER EXHAUST
 METAVATION
 VASSAR, MICHIGAN**

Sample	Date	Time	Air Flow Rate DSCFM	CO Concentration		CO Mass Rate
				PPM	Mg/M ³	Lbs/Hr
1	7/23/13	08:05-09:05	18,416	165.4	191.4	13.20
2	7/23/13	09:34-10:34	19,111	117.2	135.6	9.70
3	7/23/13	10:46-11:46	18,785	144.2	166.8	11.73
Average			18,771	142.3	164.6	11.54

- (1) DSCFM = Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- (2) PPM = Parts Per Million (v/v) On A Dry Basis
- (3) Mg/M³ = Milligrams Per Dry Standard Cubic Meter
- (4) Lbs/Hr = Pounds of CO Per Hour

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III.3 Total Metal HAP's Emission Results (Table 2)

Table 3 summarizes the total metal HAP's emission results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- Total Metal HAP's Concentration (Grains/DSCF) – Grains Per Dry Standard Cubic Foot
- Total Metal HAP's Mass Emission Rate (Lbs/Hr) – Pounds Per Hour
- Total Metal HAP's Mass Emission Rate (Lbs/Ton Charged) – Pounds Per Ton of Metal Charged

A more detailed breakdown for each sample can be found in Appendix A.

III.4 Metals Emission Results (Table 4)

Table 4 summarizes the metals emission results as follows:

- Sample
- Time
- Metals Mass Emission Rate (Lbs/Hr) – Pounds Per Hour
- Metals Mass Emission Rate (Lb/Ton) – Pound Per Ton of Metal Charged

III.5 Carbon Monoxide (CO) Emission Results (Table 5)

Table 5 summarizes the CO emission results as follows:

- Sample
- Date
- Time
- Air Flow Rate (DSCFM) – Dry Standard Cubic Feet Per Minute (STP = 68 °F & 29.92 in. Hg)
- CO Concentration (PPM) – Parts Per Million (v/v) On A Dry Basis
- CO Concentration (Mg/M³) – Milligrams Per Dry Standard Cubic Meter
- CO Mass Emission Rate (Lbs/Hr) – Pounds of CO Per Hour

IV. SAMPLING AND ANALYTICAL PROTOCOL

The sampling location for the source was as follows:

The filters, nozzle/probe rinses (front half) were analyzed gravimetrically for particulates in accordance with U.S. EPA Reference Method 5. The front half and the nitric acid/hydrogen peroxide solutions were analyzed for the specific metals by inductively coupled argon plasma mass spec (ICAP/MS) analysis. 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 will be incorporated in the sampling and analysis.

The metals analyzed were as follows:

Cupola ROP & Metal HAP's -

- Arsenic (As)
- Antimony (Sb)
- Beryllium (Be)
- Cadmium (Cd)
- Chromium (Cr)
- Cobalt (Co)
- Mercury (Hg)
- Lead (Pb)
- Manganese (Mn)
- Nickel (Ni)
- Selenium (Se)

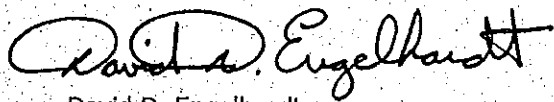
A diagram of the particulate and metals sampling train is shown in Figure 2.

IV.3 Carbon Monoxide (CO) - The Carbon Monoxide (CO) emission sampling was conducted in accordance with U.S. EPA Reference Method 10. The sample gas was extracted from the exhaust through a heated teflon sample line which led to a VIA MAK 2 sample gas conditioner and then to a Thermo Environmental Model 48H portable stack gas monitor. This analyzer is capable of giving instantaneous readouts of the CO concentrations (PPM). Three (3) samples were collected the exhaust. Each sample was sixty (60) minutes in duration.

The analyzer was calibrated with EPA protocol CO calibration gases. A span gas of 851.2 PPM was used to establish the initial instrument calibration. Calibration gases of 446.0 PPM and 243.7 were used to

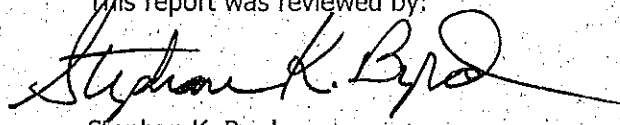
Air flow rates, temperatures and moistures were determined using the isokinetic sampling trains. All the quality assurance and quality control procedures listed in the methods were incorporated in the sampling and analysis.

This report was prepared by:



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Temperature
Sensor

Probe

Stack Wall

Nozzle

Filter

Sample
Tubing

Heated
Filter Box

Impingers with
Absorbing Solutions

Thermocouple

Check Valve

Acid Trap

Ice Bath

Empty (Optional Knockout)

Silica Gel

5% HNO_3 / 10% H_2O_2

4% KMnO_4 / 10% H_2SO_4

4% KMnO_4 / 10% H_2SO_4

Thermometers

Orifice

By-Pass Valve

Vacuum
Line

Main Valve

Vacuum Gauge

Manometer

Dry Gas Meter

Air Tight Pump

Figure 2

Metals Sampling Train

